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CLEVELAND, O., FEBRUARY 4, 1892

THE WEEK IN IRON CIRCLES.

General Features.

A steady accumulation of money at financial centers; a continued piling up of pig iron, and a growing consumption of raw materials—these are the main features of the week. New York bank deposits are the largest ever recorded. At Cincinnati and other Western centers the banks find it very difficult to secure desirable loans for their surplus. The temper of the investors is conservative, however, and while conditions are favorable for a speculative movement there is but little of the spirit of speculation abroad. In the different channels of consumption things look hopeful, and a large amount of iron is being melted. The car works are busier than they have been for years; stove foundries report an increasing trade; agricultural works are running to the full limit; makers of wood and iron work machinery are tolerably well employed; rolling mills complain that trade does not respond as they expected. While all conditions are favorable for a start towards activity, the start does not take place. Meantime, makers of pig iron are so confident of an improvement that the output continues up to the maximum. There is naturally an eager push to secure the orders that are in the field, and while this state of things continues, it is unreasonable to look for any advance in prices. The outlook on all sides is very good for a much larger trade in the coming months. The Western railroads, at their January meetings, decided to make heavy purchases of materials, including rails, cars and locomotives, and while this has not yet reached the market, its influence is, of course, felt in an indirect way. These purchases by the railroads in the West are for the purpose of making improvements and extensions to their lines in time for the World's Fair. Considerable activity has been developed at Detroit, and the situation at present would be very satisfactory were it not that low prices still continue. Buyers, who have been hesitating, are now coming into the market, and several deals of considerable magnitude have been closed, and the buying movement seems to be gaining strength daily. While Lake Superior charcoal has been in greatest demand, there have been several large sales of Ohio strong iron and low grades of Southern. There is little inquiry for Ohio silveries. Several large deals in Southern iron were made at Chicago during the past week, and others are still pending. A liberal run of small orders are being booked for both Northern and Southern coke. Now that most concerns have completed yearly inventory, and the majority report plenty of work on hand, increased activity in pig iron circles is anticipated. There is no change in Lake Superior charcoals and prices are held firm. Sales at Louisville have been in small quantities mainly, though several inquiries for fair-size lots are out for extended deliveries. Very low figures have been accepted by several Southern furnaces. There are signs of improvement in trade among the iron consumers in many branches of the business, several having lately secured good contracts. At Buffalo there is a continuance of the same market conditions, of more activity and more disposition toward long-time contracts. The volume of business is, however, still below the average and prices no better. The demand at St. Louis seems to be good, and a number of parties have placed orders to run them for quite a while. Sales have been made in the St. Louis market during the past week on a basis of $9 50 cash, Birmingham, for grey forge. The demand for car wheel iron at present is very light, while the inquiry for charcoal foundry iron shows some improvement. The Cincinnati market is featureless. Coke production remains practically the same. Shipments from the Connellsville region have fallen off a few hundred cars, owing to a shortage in transportation facilities. One large operator; who has over a thousand ovens in blast, was forced to stock one day's ouput, upwards of 2,000 tons. Prices are well maintained, and the outlook for a good business in 1892 grows brighter. The indications are that building operations will be heavy, that new industries and commercial enterprises will multiply, and that the record of last year will be surpassed by this. The Southern people have nearly $100,000,000 worth of cotton, iron and lumber yet to sell, and the Western farmers have to collect out of the entire last year's crop $170,000,000 more than the preceding crop yielded. So far, the money received by these vast interests has been used mainly to pay off old scores of one kind or another, but during the next few weeks much of this $260,000,000 or $270,000,000 will be transferred by way of cash or credits to these interests.

The Local Situation.

The vessel market remains very much unsettled, and while quite a large amount of tonnage has been covered from the head of the lakes at the season rate of $1.25, many vessel men decline to tie up their boats at that figure. They say that it will be time enough to accept it when the grain, which is still awaiting lake shipment, has gone forward. A few Escanaba charters have been made at a dollar, but the majority of vesselmen are asking ten cents better than that, so that some doubt exists whether the dollar rate establishes the market Nothing has been done in the way of Marquette charters, undoubtedly because Marquette takes less coal for up-freight than the other ports.

Iron Ore.

The ore market is rather sluggish, despite the large sales hitherto reported from the Vermilion range and the Norrie. The latter sold at $4.60, while some Gogebic Bessemer of equal guarantee sold at $4.50. The ore men expect a large increase in the volume of their business over that of the preceding year, but the market is slow to take up the matter of non-Bessemer ore. The furnacemen are in no humor to stock up in the face of a declining market, and since the ore men, by reason of increased freight charges, are compelled to ask an advance of from 35 cents to half a dollar, the prospect of a speedy adjustment seems as far off as ever. The expected combination on coal freights may have the effect of helping out the ore business, but the chances are hardly as good for the sending down of large quantities of unsold ore as to justify the anticipations of the ore interests.

Pig Iron.

To say that the pig iron market is inactive represents but one feature of a situation which for some of its aspects is unparalleled. The pig stocks now held by the Western Pig Iron Association are the largest ever reported since its organization, eight years ago, and amount to 450,000 tons of coke iron, and nearly 200,000 tons of charcoal iron. While the consumption does not seem to have fallen off to any appreciable extent, there is every evidence of overproduction, which will keep the market down for an indefinite period. The large orders reported in November, it is true have not as yet drawn heavily upon the stocks, but with the present facilities for making pig iron it will take a great many orders in excess of those reported to find a market for a reasonable amount of the overplus now on hand. The most sanguine of pig iron producers do not look forward to any improvement inside of ninety days and the good times to come may be twice as far off. There hasn't been a respectable order of Bessemer iron, hereabouts, for a month. The price is about fifteen dollars at the mill Foundry irons are little if anything better, and while $15.50 is the nominal price of the strongest quality, that figure is liberally shaded wherever competition enters any sale.

A NEW ARRANGEMENT.

By an arrangement just consummated, an important change in the editorial management of *The Iron Trade Review* will go into effect on or about February 15. Mr. W. M. Day, who has been editor since November, 1882, retires on account of the increasing duties devolving upon him as President of The Cleveland Printing and Publishing Company. As a director in The Iron Trade Review Company, however, he will still maintain a lively interest in the enlargement and development of the paper. His successor as editor will be Mr. A. I. Findley, of Akron, a journalist of varied and extended experience and a gentleman of the highest character. His newspaper training was obtained on the Philadelphia *Press*, the Chicago *Interior*, the Cleveland *Press* and the Akron *Beacon*, and he has had, in addition, a valuable business experience as a member of the book and stationery firm of Chandler, Findley & Co., of Akron, which well fits him for his new position. He will be a valuable accession to Cleveland business circles and to trade journalism.

OHIO AS A PIG IRON PRODUCER.

Comparisons between Ohio and other States, in the matter of pig iron production, are not generally made, because Pennsylvania stands so far in advance of all the rest as to attract the greater attention. It should not be forgotten, however, that Ohio still retains, as she has for a number of years, a good second place as a pig iron producer, and present indications do not seem to argue her early displacement from that position. The year 1891 was marked by a decided restriction in output on the part of the most important district in Ohio, the Mahoning Valley, so that comparisons for that year are not altogether favorable to this State. Nevertheless, these facts are worth remembering: In 1891—

Ohio produced 13 per cent of the entire output of the United States.

Ohio produced nearly one-quarter of all the pig iron turned out by the States, not counting Pennsylvania.

Ohio's production was only a trifle less than the combined output of Illinois, Michigan and Wisconsin.

The nine Southern States combined produced less than one and three-quarters times Ohio's output.

Alabama, the greatest Southern iron producing State, fell short of Ohio by 268,061 tons.

Alabama and Virginia are two great pig iron-producing States, yet their combined output exceeded Ohio's only by 71,666 tons.

Taking the Mahoning Valley alone, we find that its production, 396,378 tons, was greater than that of New York, exceeded that of Virginia, left Tennessee in the shade, and was more than 150,000 tons greater than that of either Michigan or Wisconsin.

In the production of Bessemer pig iron Ohio stood third, Pennsylvania and Illinois surpassing her, but, leaving out these two States, Ohio produced more Bessemer pig than all other States combined.

In these days of extravagant claims in behalf of other sections it may be well to remember these facts.

WORLD'S FAIRS AS MONEY MAKERS.

Recently *The Iron Trade Review* gave a summary of the balance sheet of the World's Columbian Exposition as it appeared January 1, 1892, and no doubt the careful and conservative reader was struck with the magnitude of the enterprise and its vast possibilities for making or sinking a "heap" of money. Perhaps some recent figures as to the outcome of the Paris Universal Exhibition of 1889 may be instructive, in the light of the Chicago estimates. From recent analyses of the receipts and expenditures of the Paris Exhibition we learn that the receipts were made up of the money paid for admission, the produce of different concessions and lettings of space, the sale of materials afterwards, the subsidy of the city of Paris, and the amount contributed by the state. There were no fewer than 125 concessions of various kinds for cafes and restaurants, which produced about $436,000, while a sum of nearly $43,600 was received for concerts, subscription to water and gas, the total receipts amounting to $9,700,000, or $1,358,000 more than the estimate for them. The receipts of the 1867 exhibition were $5,103,000, while those for the exhibition of 1878 did not amount to more than $4,505,220, including a subsidy of $1,202,800 from the city of Paris. Upon the other hand, the expenses of the 1889 exhibition, which had been estimated at $9,031,000, did not amount to more than $7,760,00, while for the 1867 exhibition they were $4,543,800, and for that of 1878, $10,747,600, including a sum of $2,716,000 spent upon the Palace of the Trocadero. In other words, while the 1889 exhibition left a profit of $1,940,000, that of 1867 gave one of only $543,200, and that of 1878, organized at the cost of the state, left a deficit of $6,149,800. It should be pointed out, however, that in 1878 there was no subsidy from the state, whereas in 1889 the state contributed $3,298,000, and in 1867, $1,164,000.

According to the estimates of the Chicago Exposition Company, the total amount to be expended for buildings, grading, steam plant, administration, etc., is $18,430,453. The estimated resources (including prospective gate receipts, $10,000,000) foot up $23,754,682, leaving a possible margin of $5,000,000; but as the profits of the Paris Exposition (which was universally pronounced the most successful ever held up to that time) were less than $2,000,000, it will not be well to count too confidently upon such heavy profits. Nevertheless the Chicago affair promises to eclipse even the Paris triumph, and there is no knowing how big a thing Americans can do, until they have done it.

PROSPECTS OF THE COTTON-TIE BUSINESS.

A strong effort (on paper so far) is being made to transplant the comparatively new cotton-tie industry from the North to the South. Intelligent and pushing Southern papers are giving column after column to the subject, but as yet, we believe, no cotton-ties are being manufactured in that section. In the meantime, if we are to believe the statements of some of the writers, the extensive Solar Iron Works of Wm. Clark's Son & Co., the Star Iron Works of Lindsay & McCutcheon and the Pittsburgh Iron Works of J. Painter & Sons are running night and day to their fullest capacity, turning out cotton-ties, hoop, band and scroll iron, to the extent of nearly 65,000 tons per annum. As to foreign importations they have, as has repeatedly been shown by *The Iron Trade Review*, been entirely shut off. Upon this fact a writer in the *Tradesman* says:

Finally, to illustrate the very beneficial workings of the tariff law, at least as far as the manufacturing of cotton ties is concerned, we will give a comparison of the importations at and about the period of the expiration of the old law and the inauguration of new law, compiled from the monthly summary of statistics of the Treasury Department, a source of information the authority and accuracy of which is far above question.

In the report of importations, issued September 30, 1891, hoop iron is classified under two heads: First, "hoops or ties for baling purposes—barrel hoops and hoop or band iron or steel, flared, splayed or punched—and this includes cotton ties and barrels cut to length" referred to as the above proviso.

The second classification is a general one of "hoop, band or scroll iron or steel," and is exempted from the construction of the said proviso.

Under the first head the importations for the month of September, 1890, amounted to 7 480,725 pounds, and for the nine months ending September 30, 1890, the importations were 32,014,414 pounds, and for the present year, 1891, up to and including the month of September, there has not been imported a single pound of such iron or steel as is embraced under the first head.

Has ever such a remarkable and compact contract been presented in the history of the iron trade in this or any other country. The condition of things has even been worse than revolutionized.

They have undergone a comp'ete and thorough reorganization. Under the second class, the importations for the month of September, 1890, amounted to 265 547 pounds, and for the nine months of that year, embracing the month of September, the importations aggregated 11,573 892 pounds, while for the same period of 1891, January to September inclusive, the entire total of the importations of the articles embraced in the second class amounted to only 979,645 pounds. A revolution as thorough as the former, when all things are considered.

During the first nine months of 1890 the total importations of articles embraced under these two heads aggregated 43,372 306 pounds, while for the same period of 1891 the total importations of similar articles amounted to but 979,645 pounds.

There is probably a poetic justice in the claim that the South should make its own cotton-ties, but in the meantime there are many advantages which Northern works enjoy, for instance, in the way of cheap fuel and skilled labor, which evidently have not been taken into the writers' calculations.

MR. JAMES M. SWANK, the indefatigable General Manager of the American Iron and Steel Association, has performed a signal service to the world of commerce and literature in the production of a portly volume of 550 pages entitled "The History of the Manufacture of Iron in All Ages."* The first edition, which appeared seven years ago, met with instant and widespread recognition for its exhaustive research no less than its literary merit, and the present revision, containing as it does much new information, would seem to be indispensable to every well equipped library. It is not our purpose to go into details regarding this remarkable work, but we may be permitted to congratulate the author upon this latest evidence of his distinguished ability, and to predict for his work an increasingly gratifying sale.

*History of "The Manufacture of Iron in All Ages," and particularly in the United States from colonial times to 189'. Also a short history of early coal mining in the United States, and a full account of the influences which long delayed the dev lopment of all American manufacturing industries, by James M. Swank, Secre ary and General Manager of the American Iron and Steel Association for twenty years, from 1872 to 1892. In one volume, royal octavo, 574 pages, large type, good paper, well printed, best cloth binding, gilt title. Second edition, thoroughly revised and greatly enlarged. Sold only at the office of the American Iron and Steel Association. Price, $7.50.

NEW ENGLAND'S IRON AND STEEL OUTPUT.

The rolling mills and steel works of New England were in operation an average of 10 months during the census year 1890. The average term of employment for men was 11 months, for women 12 months, and for children 10 5 months, the excess of the average term of employment over the average term of mill operation being caused by the fact that the establishments employing the greater number of hands also report the maximum term of operation. In three mills nine hours constituted the day of labor, and in the remaining establishments the men worked 10 hours per day (six days per week) throughout the year. In 1880 the rolling mills and steel works of this section employed 7,791 hands, and were in operation an average of 9.75 months during the year.

A comparative statement of the quantities and cost of materials consumed by the rolling mills and steel works of New England in the census years 1890 and 1880 is presented in the following table. Quantities are stated in tons of 2,000 pounds except for charcoal, which is stated in bushels:

Materials.	1890.		1880.	
	Quantities.	Cost.	Quantities.	Cost.
Iron ore (tons)	2,277	$ 14.931	20,212	$ 141,154
Pig iron (tons)	17,565	359,661	56,918	1.352,553
Spiegeleisen (tons)	623	44.511	855	21,500
Old iron rails (tons)	26,279	655,762	36,503	1,048,414
Other old or scrap iron (tons)	71,939	1,168,528	78,267	2,108,820
Old steel rails (tons)	2,668	50,692	1,400	35,000
Other old or scrap steel (tons)	20,145	243,531	5,008	156,759
Hammered iron ore blooms (tons)	170	7,200	8,187	435 150
Pig or scrap blooms (tons)			2,226	89,0.0
Purchased Bessemer steel (tons)	83,884	2,489,502	16,600	964,000
Purchased open-hearth steel (tons)	10,825	365,207	3.440	266,200
Anthracite coal (tons)	16.829	81,702	44,095	2.0,046
Bituminous coal (tons)	186,900	760,288	213,055	1,037,413
Coke (tons)	5,350	35,571	3,545	10,410
Charcoal (bushels)	919,303	76,289	673,786	50,113
All other materials (a)		2 198,623		922,332
Total		$8,651,998		$8,833,874

(a) Includes purchased muck bar, Swedish billets and bars, purchased wire rods, copper and miscellaneous supplies.

While the consumption of old or scrap iron of all kinds has not varied greatly in the two census years, there is seen to have been a considerable decrease in the quantity of pig iron used. Most of the pig iron consumed in 1880 was used by the rolling mills in the production of the various iron products, while in 1890 almost the entire quantity was converted into steel. The most notable increase in the consumption of materials in 1890, as compared with 1880, was in purchased Bessemer steel.

The total tonnage of rolled and hammered products made by the rolling mills and steel works of New England in the census years 1890 and 1880 is given in the following table:

Products.	1890. (Tons.)	1880. (Tons.)
Iron	86,103	148,692
Bessemer steel	93,746	16,406
Open-hearth steel	25,702	14,676
Crucible steel	2 753	2,205
Total	208,304	181,979

—[Census Bulletin, No 156.

CAPITALIZATION OF AMERICAN RAILWAY PROPERTY.

The railway property of the United States above described is represented by railway capital to the amount of $9.437,353.372, being $60 340 per mile of line. This figure covers 156,404.06 miles of line. Assuming that the mileage for which no satisfactory reports pertaining to capitalization have been received in this office is capitalized at the same rate, an assumption which is, perhaps, a little extreme, it appears that the total capitalization of railways in this country would be $9,871,378 389, or nearly ten billions of dollars.

An analysis of railway capital for the entire country shows but few changes from the analysis presented in last year's report, and on account of the fact that in last year's analysis the Canadian Pacific mileage was included, while in this report it is excluded, a comparison between the capitalization for the two years in question would be of little significance. It is interesting, however, to notice that the exclusion of the Canadian Pacific mileage chiefly accounts for the increase in the capital per mile of line from $58,775 to $60,340. The true increase in railway capital for the year ending June 30, 1890, on railways in this country is $538,079,233, of which at least $250,000,000 is due to the increase in capitalization on lines already in existence. Whether or not this represents the true increase in value of railway property is a pertinent question. * * *

According to the original theory of railway securities, a bond is a mortgage placed upon property represented by stocks. The amount of bonds issued, therefore, should be, according to this theory, less than the amount of stocks issued; but by reference to above summary it will be seen that Group I and Group X are the only ones that conform to this rule. In the case of Group I this is probably due to the laws enacted in certain of the New England States with regard to corporate capitalization, and to the fact that, so far as railways are concerned, these laws are fairly well enforced by the railway commissions; for it will be observed that the issue of stocks in this group is $27,829, and of bonds $19 412 per mile of line. But in Group X, that is to say, on the Pacific Slope, while it is true that stock exceed bonds, it is also true that stocks are issued for $48,128 and bonds for $35,845 per mile of line, making a total capitalization of $87,104. It can hardly be said, in view of such an exhibit, that the excess of stocks over bonds in this territory is due to conservative railway management.

The railways which are most culpable in their overissue of bonds as compared with stocks are those which lie in Group II and in Group VII. In the former group bonds exceed stocks by $6,577 per mile of line, and in the latter group by $7,180 per mile of line. So far as Group II is concerned, this is doubtless due to the fact that the Middle States, in which are located three of the four important Atlantic seaports, present a more fruitful field for railway operations than any other section of the country, and managers of railways can on this account easily borrow money upon bonds in excess of the issue of stocks; for it must be remembered that in a rough way bonds represent the certain or bed rock value of railway property, while stocks represent their speculative value. In Group VII the relative excessive issue of bonds is explained by the fact that many of the lines in this group have been built as extensions of lines centering in Chicago, and consequently it is the credit of these old lines, and not the credit of the lines in the territory of Group VII, which permits the excessive sale of bonds.

It will be observed that the railways in Group II are capitalized at $117,902 per mile of line, being a higher figure than is reached by the railways in any portion of the country. The only roads that approach those of the Middle States in capitalization are the roads in California, Oregon and Washington. The explanation of this overcapitalization will be found in that series of accidents, mismanagements and shrewd managements which make up the history of railway development in the United States. There is no question of more vital importance to the just policy of Government control over railway affairs than the one thus brought into prominence. * * *

From another summary it appears that the amount of investment held by railways, the income on which reduces the amount that must be demanded from the public for the support of outstanding capital, is $1,406 907,001, being an increase of $254,934,100 over the amount held on June 30, 1889. If the reasoning in last year's report be accepted as correct, this investment is equivalent, so far as the public is concerned, to the extinction of an equal amount of stocks and bonds. The increase in the amount of stocks held is $116,113.360, and the increase in the amount of bonds is $138,820,740. * * *

The total amount of stock returned in last year's report as paying no dividend was 61.67 per cent.; for the year ending June 30, 1890, it is observed to be 63 76 per cent. Outside of the New England and Middle States, more than one half of the total stock paid no dividend. The favorite rates of dividend, so far as payments were made, seem to be 4 per cent., 5 per cent. and 6 per cent., these rates accounting for nearly one billion of the total outstanding stock. It certainly appears from the above exhibit that the motive for ownership in railway stock is quite different from the ordinary motives which lead men to invest in corporate enterprises, thus presenting an additional proof that railways are a business not subject to ordinary business rules.—[Third Annual Report of the Interstate Commerce Commission.

For a Canal Between Philadelphia and New York.

A meeting of the New York Board of Trade and Transportation, held on the afternoon of January 13, was addressed by Mr. Thos. C. Martendale, of Philadelphia, and Prof. Lewis M. Haupt, of the University of Pennsylvania, in favor of a canal following the general course of the Delaware and Raritan Canal, but leaving out Trenton and from the twentieth mile from the Delaware following the Lawrence Brook to Raritan. Professor Haupt's idea of the cost of this canal, enlarging the bed of the present canal to a prism of 90 feet in width on the bottom with 20 feet depth, and making the new parts of the same prism, is $12,500,000. This estimate includes six locks 500 by 60 feet; two tidal locks and four lift locks to overcome an elevation of 50 feet. The total length of the canal will be 33 74 miles. Mr. Martendale showed reasons for estimating the saving on the coal freights of this city from the Schuylkill coal fields at 50 cents per ton. This would pay nearly 25 per cent. on the estimated cost. In the course of statements showing the growth of the country the following table, which was vouched for as the result of careful examinations of building records, is given, showing the number of houses built during the past five years in the cities named.

Philadelphia	42,170	Pittsburgh	13,715
Brooklyn	20,111	Boston	9,525
New York	17,997	Baltimore	7,776

Attention was called to the fact that Philadelphia built more houses than New York and Brooklyn. At the close of the addresses Mr. Wiman moved that Congress be asked to appropriate $25 000 for surveys to establish the cost of the canal, which, after some opposition from Mr. O B. Potter, was passed.

New Flexible Metallic Tubing.

A new kind of tubing, of interest to steam power users and electrical engineers, has been brought out in England, says the *Electrical Engineer*, London. The tubing is flexible, and is made in a machine from metal strips of the necessary length, width and thickness, according to the purpose for which it is required. In passing through the machine the strips, which are of steel, galvanized steel, or otherwise, have formed upon one side two corrugations in a longitudinal direction, one being large and the other small. The corrugated strip is then coiled in the form of a spiral round a mandrel, this operation being so performed that the small corrugation enters the large corrugation and interlocks with it. This forms what is known as a piston joint. The tubing, which is unaffected by ordinary liquids or gases, has been tested both at high and low pressures—steam up to 60-lb., and hydraulic up to 1,000-lb. to the square inch. The tubes are made from 5-16-inch to 3 inch internal diameter, and plant is now being laid down for the manufacture of tubes up to 12 idches diameter. This kind of tubing is now in use for a variety of purposes, including gas and steam pipes, compressed air, speaking tubes, and also as sheathing for electric light cables, whilst it can likewise be used for running ordinary house leads. A special type of coupling, which will not give way under the pressures mentioned, is used for joining lengths of tubing.

SPIRIT OF THE TRADE PRESS.

SOME FEATURES OF THE MARKETS.

Recent Purchases of Heavy Materials.

The principal event of the week has been the closing of contracts for the material for two vessels which the Union Iron Works, of San Francisco, will build for the Pacific Mail. One of the contracts for 2 500 tons of material has been taken by a mill in Eastern Pennsylvania, while the other of like amount has been captured by a Pittsburgh producer. It is understood that the price for the ship plates was 1.85 cents at mill. Steel makers for bridge purposes are considerably agitated over the fact that A. P. Boller, the engineer of the McComb's Dam Bridge, has introduced a clause in the specifications limiting the steel to be furnished to open-hearth acid steel, although he does prescribe physical tests. Considering the fact that both open-hearth and Bessemer basic and acid Bessemer have been largely used for bridge work in this country, this attitude is a surprise and does not seem justifiable, since tests are called for. The bridge in question was let some time since to the Union Bridge Co., but is now to be advertised again in about a week. It calls for a considerable quantity of structural material.—[Iron Age.

Condition of the Money Centers.

Of late the demand for loans is increasing, but contrary to general expectation, the new activity which is developing is one of the most conservative features of the financial situation. The extraordinary pressure of recent events on the money market has abundantly served to illustrate the latent mobility and energy of its resources, with its elasticity and promptitude in meeting legitimate demands of commerce and trade. The war excitement, the return of a few speculative securities from abroad, the increase in the exports, the slow growth of the expected animation in some departments of business, the lack of demand in the South, and the plethora of deposits in the banks of several of the greater financial centers are among the incidents which command attention, and are diversely interpreted by the best authorities, some taking the less favorable view of the prospects of the near future, while others incline to predict that the prosperity of our commerce and trade this year in all probability, will fully respond to the most sanguine anticipations.—[American Banker.

Foreign Iron Markets.

Although a better tone is reported from the North of England, it cannot be said that the tendency in the English and Scotch markets generally has much improved since last week, there being as yet no indications of greater confidence in the future. Pig iron is steady in the North and in Staffordshire, but weaker in Scotland and Lancashire. Warrants are practically unchanged. The finished iron market is almost uniformly firm, manufacturers in the North of England having been able to put up their quotations for bars 2s. 6d. a ton. Sheets, on the other hand, in Lancashire, are 2s. 6d. lower. The Staffordshire makers are able to be fairly firm at their quotations. Steel is not in brisk demand, but still a moderate trade is passing. North of England producers of plates and angles have rsised their prices 2s. 6d. a ton. Shipbuilders are fairly active, and report good prospects. Engineers are doing better. The Belgian iron market is still depressed, but a slight improvement is reported in the demand for bars, buyers considering the present low prices the most advantageous for placing forward contracts. They are not, however, readily met by makers, who are not willing to engage themselves for deliveries beyond the end of the current quarter. The French iron market generally remains steady, and there is a slight improvement also at Paris. The condition of the German iron market has not improved, trade being still dull, with no prospect of an early improvement. The tone of the market is weak. The German imports of iron and steel and machinery in the first ten months of 1891 amounted to 299 957 tons, against 491,354 tons in the corresponding period of the preceding year; the exports, to 1,036 488 tons, against 834 162 tons. The coal markets of the Continent are unchanged, those of Belgium and France being steady, and that of Germany weak. Trade is not too active in either country.—[Iron and Coal Trades Review, London.

Some Observations from Wheeling.

The fact that trade continues to manifest a positive disinclination to begin the ascent without vigilant regard for the security of its footholds, as it seeks to emerge from the hindering bogs of depression, is a wholesome indication; it means that no upward step will be taken without well established warrant, and that the load it has to carry, in the shape of an immense output with top-heavyish inclinations, is a very serious matter, too serious by far, to stand the reckless under play of the speculating sharps. Prices did make a manifestation a fortnight ago, that was more than a feint, because it was an actual evidence of purpose; but realizing, apparently, that the opportunity was not yet ripe, the movement was not continued. In the classic diction of the euphuistic indigines of Webster county, the improvement in prices, "started to went, but the gwi'en was so bad it didn't came," and so we'll have to wait a spell. The improvement "didn't came," sure enough, but undoubtedly enough of assertion was manifested to indicate that conditions have overcome the downward tendency, and that an upward movement is merely waiting an opportunity to develop and stay with us as long as it is not abused by excessive stimulation. Prices lost something of the assertion they undertook to assume, just as soon as it became apparent that the large consumers of pig iron had, for the nonce, provided for their requirements, and they weakened a little, because the demand lulled. It seems to have been established, if reports that are ordinarily trustworthy are veracious, that the prices of Bessemer ores are to be from 35 to 50 cents higher than those of last year, and, what is not at all singular, this advance in the prices of ore was fixed just after the before mentioned large consumers had made heavy contracts for supplies of pig iron. Anyone who can "put this and that together" will realize that a few somebodies have been playing rather a cute game, and that these somebodies are very likely to make the game pay them sizable profits. $15 50 to $15.75 is not a fair price for pig iron made out of $4.75 ore, and it is only reasonable that the pig iron makers should have the benefit of the advanced cost of producing, from the time that the prices of ore are advanced, even if they have some of last year's ore still on hand. This claim is reasonable, because it is extremely probable that more profit is gained by these incidental opportunities, than is derivable from the regular transactions of a whole six months' campaign; but I do not mean that it is reasonable that such incidental chances should inure only to the advantage of those few large consumers of both pig iron and ore.—["Cold Short" in Ohio Valley Manufacturer.

FROM FOREIGN CONTEMPORARIES.

Passing an Electric Current Through Molten Steel.

A Sheffield inventor has taken out a patent for improvements in the manufacture of steel, by passing an electric current through molten iron or steel, either during or after casting, in order to "induce the molecules to arrange themselves in such a manner as to condense and consolidate the metal." The current may be passed by fixing one electrode in the bottom of the mould, whilst the other is held in the stream of metal issuing from the ladle.—[Glasgow Engineer.

The Biggest Belt in the World.

The largest driving belt in the world has just, says London *Iron*, been turned out at the works of Mons. Domanage-Scellos, Boulevard Voltaire, Paris. It has been made to the order of an Amiens manufacturer, and is intended to transmit 1,000 horse-power. It is on the homogeneous system, that is to say, it is composed of a large number of leather bands interlaced with each other, and secured by strong cords. It is 120 feet long, seven feet wide, and nearly an inch thick, the weight being a ton and a half; and it is to put a fly wheel 22½ feet in diameter in communication with a pulley over eight feet in diameter. Its speed under ordinary conditions will be 67 feet per second. The steam engine intended to run with this gigantic belt is being built by Mons. Dujardin, of Lille.

British Metallurgy at the Chicago Exhibition.

The Royal Commission for the Chicago Exhibition are endeavoring to form a typical collection, illustrating British metallurgy for the British Section, and they are now applying to owners and managers of metallurgical works, asking for specimens of each of the principal metallurgical products produced at the works, and also for specimens illustrating various processes. Dr. E. J. Ball, the instructor in assaying at the Royal College of Science, South Kensington, has kindly undertaken to classify and arrange the collection, and specimens may be addressed to him. What is required is not specimens of special value or rarity, but samples of metals, regulus, slags, alloys, etc., so that the collection when complete may be fully illustrative of the condition of metallurgy in the kingdom. Samples of metal sent should, where possible, be freshly fractured, and attention should be paid to any special unmanufactured products for which a market is desired. At the close of the exhibition the collection will be presented to an American Museum, so that it will have a permanent value.—[Iron and Steel Trades Journal, London.

The Swedish Iron and Steel Industries.

From the report, just issued, upon the iron and steel industries of Sweden in 1890, we learn that 940,400 tons of magnetic iron ore were raised from 390 mines, and 810 tons of lake and bog ore from various lakes. In 1889, 393 mines were worked, yielding 983 600 tons of ore, the quantity of lake and bog ore raised being 2,290 tons. It is worthy of note that the number of iron mines worked in Sweden is decreasing year by year, but the output increases, five provinces or *lan* alone producing two-thirds of the entire output of ore. In the province of Upsala 62,000 tons of the famous Dannemora ore were raised, used in the manufacture of the finest steel for cutlery and fine tools. The production of iron ore in Sweden in the quinquennial period 1886 90 was as follows: 1886, 850 000 tons; 1887, 884,000 tons; 1888, 937,000 tons; 1889, 983,600 tons; 1890, 940 400 tons. Turning to the Swedish pig iron industry during 1890, it appears that 154 furnaces were in blast, producing 456,000 tons of pig, whilst 4 650 tons of castings were returned direct from the furnaces. In 1889, 150 furnaces were in blast, producing 420,700 tons; and in 1888, 162, producing 444,000 tons. Of late years the manufacture of this kind of iron has been decreasing, owing to the falling demand of prices. The largest output from one works—viz.: 28,000 tons—was that of the Domnarfvet Iron & Steel Works. The average output per furnace last year was 2,961 tons, as against 2,804 tons in 1889, and 2,760 tons and 2,600 tons respectively in 1888 and 1887. It will therefore be seen that the method of working the furnaces is steadily improving. The output of Swedish pig iron in 1886 90 was as follows: 1886, 447,000 tons; 1887, 447,500 tons; 1888, 444,000 tons; 1889, 420,700 tons; 1890, 456,000 tons. The hands employed in this industry last year numbered 3,862, as against 3,823 in 1889.—[Colliery Guardian, London.

COMMENTS ON TIMELY TOPICS.

Machinery in Modern Office Buildings.

The machinery used in modern office buildings in large cities is assuming notable proportions. It is stated that the Masonic Temple, at Chicago, which has 21 stories, including the attic and promenade deck, will be furnished with two Corliss engines of 500 horse-power each and eight Scotch marine steel boilers of 125 horse-power each. It might easily be inferred that this power plant was intended, to some extent, for manufacturing, but that is not the case. The power will be exclusively applied to the special object of adapting the building to the use of its tenants for office purposes. There are to be 17 elevators, with a carrying capacity of 50,000 persons daily, and an electric light system capable of supplying 7,000 lights. Water will have to be pumped to tanks on the roof to furnish such a tall building as this with the water re-

quired, as it is 302 feet from the level of the street to the roof line. It is estimated by competent and well-informed engineers that the power plants now installed in the office buildings of Chicago would aggregate almost if not quite as much horse-power as one of the largest and best equipped steel rail works. This is a remarkable incident of the progress of the age.—[Iron Age.

The Disreputable Truck System.

We notice in the advertising pages of the *Engineering and Mining Journal* an advertisement of what is called a "coupon book." The advertiser asks readers, "Do you run a store in connection with your mine, camp or factory?" "Do you know that by using coupons you can completely control the patronage of your hands at the store? You can count up your daily sales the same as if you had taken in all cash, which you cannot do if you use punch checks. The great drawback to the check system—that of the checks being transferable—is overcome." The inventor of this device, by which the "patronage" of "your hands" can be "completely controlled," thinks possibly that he has invented something that is of some real use in the world, and he publishes his picture in the advertisement as though he was proud of his achievement. We cannot find words to express our disgust at the man who can find no better use for what abilities he may possess than to employ them in getting up and selling such a thing as this. And we have no hesitation in saying that any respectable journal ought to be thoroughly ashamed to publish such an advertisement. Such an advertiser and such a journal are doing what they can to advance the day when there will be trouble resulting from the outrages that are practiced by the assistance of such devices as this.—[American Machinist.

The Unreliability of Cast Steel.

As to the unreliability of cast steel, the annual report of Chief-Engineer G. W. Melville, U. S. N., contains some important information. He asserts that "the only reason for using cast steel instead of cast iron is that advantage may be taken of its greater strength to reduce weights. There can be no greater absurdity than to make steel castings of the same size as those of cast iron with a view to greater safety, if the strength of the iron casting is ample; steel castings cost four or five times as much as iron ones, and it would be a deliberate waste of public money to use material in this way." As an instance of the small progress in the making of reliable steel castings, Chief-Engineer Melville cites the attempt to apply such castings to perfectly plain hollow columns in a certain ship. He asserts that "in cast iron" these "would have been the simplest kind of work; in cast steel every one was so imperfect that they could not be used. After the failure of these columns the steel makers claimed that they were of a shape impossible to cast in steel; but before the castings were found defective, not one of the makers thought there would be the least trouble in making them." However, as in other lines of work it has been possible to discover causes for failure and to remove them, Chief-Engineer Melville expresses himself as "inclined to believe, that in time, this will be done for steel castings, since one firm has already successfully produced forms that the other makers said could not be cast, and their manager has stated that it is simply a question of time and the education of superintendents and workmen before we can safely count on the production in cast steel of any form now made in cast iron."—[Engineering Magazine.

Steel Making on Lake Superior.

To the city of Superior, at the head of the lake, belongs the distinction of having inaugurated the manufacture of steel on Lake Superior. On the afternoon of January 27th the first heat was drawn at the plant of the Superior Iron & Steel Co. there, and the first Bessemer steel ever made in the Lake Superior region was successfully produced. The event is worthy of note, for it signalizes the birth of new industry in this region that the *Mining Journal* confidently believes will grow to great proportions, and will in time lift the Lake Superior iron fields from their present position of almost entire dependence on Eastern furnace and mill interests. Coke iron is also manufactured now at the head of the lake, the furnace of the steel company, at West Duluth, having gone into blast. The ore used is, we are informed, from the Vermilion and Gogebic districts, and the fuel is obtained from the coking plant of the Lehigh Coal Co., at West Superior, where there are 75 coke ovens in operation. It is not stated that the pig iron used to produce the steel turned out at the Superior steel mill was smelted at the West Duluth furnace, but that was undoubtedly the case, as the product of the furnace on the Minnesota side of the bay has been supplied to the steel plant on the Wisconsin side since the West Duluth furnace was put in blast. It may be stated, therefore, that steel making [illegible]perior from ores mined here, and smelted here with fuel coked in Lake Superior ovens, is a demonstrated success, and we may now look forward to the time when a good share of our ores will be turned into iron and its finished products at home, instead of being shipped in the crude form to Pennsylvania and Ohio furnaces and mills for manipulation.—[Marquette Mining Journal.

LAKE SUPERIOR MINING NOTES.

The Florence is reported to have over 130,000 tons of ore in stock at the present time.—[Mining News, Florence, Wis.

Operations will soon be resumed at the Webber-Peterson exploration on section 24, 40-17. A plant of machinery will be put in, and the work of development energetically prosecuted.—[Mining News, Florence, Wis.

Capt. Culgren, of the Sheridan, Iron River's promising new mine, recently visited the Norton-Kanutson exploration, on the southwest quarter of the southeast quarter of section 3, and the northeast quarter of section 10, 38-18, this county, and reports that the indications, judging from the ore outcroppings for a large body of ore are very good.—[Mining News, Florence, Wis.

The Minnesota Iron Co. is making preparations to sink Alaska shaft 500 feet further. It is now down over 300, and 800 feet will bottom it on the foot wall side of a large lense of ore located last Summer with the No. 10 Sullivan drill that bored a 2,700-foot hole. Shaft sinking is also in progress at several other localities about the Minnesota and the outlook indicates an unusually active season's work next Summer, if the ore market will warrant it.—[Vermilion Iron Journal.

The Mansfield's shaft is 45 feet below the fourth level. As soon as the fifth is reached the diorite and slate will be cut to the ore vein and a start made with the shaft for the sixth level.—[Diamond Drill, Crystal Falls, Mich.

The Pike Mine is a promising property near Wakefield, located west of the Brotherton, and between that excellent mine and the Chicago or Sparta. Development work at the Pike is being pushed forward at a lively rate, and the mine will be a shipper this year for the first time. The single working shaft on the property has acquired a depth of about 230 feet, and they are now opening up the third level.—[News Record, Ironwood, Mich.

The Royal, is the name by which the Geneva property, two miles east of this city, will be known in future. As stated in the *News Record* last week, the trouble between the option-holders has been settled, and Milwaukee parties have secured control. The Cream City fellows have associated themselves, and filled articles of incorporation at Madison of the Royal Mining Co The capital stock is $10,000. The following are the incorporators: James G. Flanders, Charles Goss, Edward G. Asmus, Charles E. Wild and Elias H. Bottum.—[News Record, Iron Mountain.

All of the stockholders from the Buckeye Mining Co. visited the mine. and came back very enthusiastic over the present condition and future prospects of the same and all more sanguine than before of the favorable indications. The shaft is down 45 feet of which 29 feet is in ore that assays 62 per cent. and improving as it grows deeper. A night and day shift will soon be put on in double force. The railway company put in a spur and it is expected that shipping will begin some time next Spring. Capitalists and experts consider that the same vein has been struck as that of the Commonwealth.—[Eagle.

The Dunn mine's stockpile will even to 15,000 tons to night, representing more an accumulation from developmental work than active exploration. No. 2 shaft, from which lowering was commenced from the 400-foot level, is now 50 feet below that and will go on to a depth of 500 feet. The shaft has departed from the regular ore vein and is now in the foot wall. At the resting depth a cross-cut will be put through to the ore. In this work a separate lens of ore was cut, which will be more fully investigated later on. The diamond drill hole going east at the south end of the property, has a depth of 265 feet, and as yet has shown nothing of value, the formation penetrated being considerably mixed. On the 280-foot level a drift is going south from No. 1 shaft and is opening an apparently large body of ore. The south end stripping will be completed this week and a start at taking down ore in that part of the mine will be made next week. Every detail is working the very smoothest and the coming of the new shipping season will see the Dunn in better shape than ever before.—[Diamond Drill, Crystal Falls, Mich.

THE SMOKE NUISANCE IN CHICAGO.

The society for the prevention of smoke, which has recently been formed in Chicago, is getting into working shape. It has regularly employed Mr. White, of Dunkirk, N. Y., as its consulting engineer. Mr. White is a graduate of the Worcester (Mass) Polytechnic Institute, and has been a practical mechanical engineer for more than fifteen years. For six years he was superintendent of the School of Mines of St. Louis, and has given a great deal of study and attention to furnaces, and the causes that produce the great amount of smoke which is so objectionable and such a nuisance in every city. Mr. White has taken a very sensible course in beginning his work. He will devote a week or ten days to the study of the condition of affairs, visiting all the large plants, not only those which are producing smoke, but those which are not, and in this way become thoroughly acquainted with what has been, as well as what can be, done. It is an established fact that the great clouds of smoke can be almost, if not entirely done away with. It has been done in London and there is talk at that place of attempting measures to reduce the amount of smoke produced by the chimneys in private houses. This seems like a very radical step, but it shows the extent of the feeling in regard to this matter in that country.

Most of the railroads entering Chicago affirm that they are doing everything in their power to prevent the unnecessary smoke from their locomotives. In the face of these assertions, however, some of the roads are using in the city locomotives provided with the old-fashioned diamond top stack, and having no combustion flues in the fire-boxes. This does not look as though they were acting in good faith in this regard, but going on the assumption that the people who are attempting to remedy the smoke nuisance do not understand these points regarding locomotive construction. It has for some time been demonstrated that the application of the extension front and straight stack to a locomotive materially decreases the amount of smoke produced. It is not necessary to have the testimony of experts to prove the fact that they produce less smoke; any unprejudiced persons, by watching the engines for a short time, can satisfy themselves in this regard. While some of the roads are putting on smoke consumers, and making all possible effort to aid the city in wiping out the nuisance, others are doing nothing whatever, and at the same time asserting that they are doing all in their power. The well managed and progressive roads are adopting these improved devices for the sake of economy, and find it to their own interest to do so, as they are perfectly well aware of the fact that all the unconsumed gases and smoke which go out of the stacks is that much lost money, and is a continual waste, while the cost of making an improvement, after once being incurred, is done with. A saving of a few pennies every day will soon pay for quite an expensive improvement.

If the society manages this matter judiciously it will not only confer a favor on the city but also on the individuals or corporations who are compelled to adopt the smoke consuming devices.—[Railway Review.

GILL'S WATER TUBE STEAM BOILER.

The rapid growth in popularity of the water tube type of steam boiler has been the best evidence of its economy in space and fuel, its safety, its durability and its general superiority. An approved type is herewith illustrated. In the construction of the Gill boiler, the water tubes, four inches in diameter and spaced about three inches apart, are inclined at an angle of about fifteen degrees from the horizontal. Each nest of four or five tubes is expanded into a cast-iron box or header at each end in such a way that the tubes are staggered instead of being placed one above the other. By thus making these boxes short, and by connecting them by slightly flexible tubes, the danger of breakage is entirely avoided, which is of common occurence where the headers are made in one long cast-iron box. The connection between the headers and the steam and water drum over head is exceedingly simple, consisting of short tubes which are expanded into the top of the headers and into the drum entering the latter radially, for which purpose they are curved to the proper form.

The drums are made in sizes varying in diameter from 30 to 50 inches, proportioned so as to allow a cubic foot capacity for steam space and a cubic foot for water storage in the drums for each horse-power developed. Thirty-inch drums have been found to be the smallest size that will allow of the production of dry steam under conditions of rapid driving. The drums are made of the best steel, and the thickness is proportioned for the highest pressure desired, with ample factors of safety. The bank of tubes is divided into two or three sections by one or two flame walls made of fire brick, firmly secured by rods running through them and into the side walls. The flame and heated gases are thereby compelled to traverse the tubes two or three times before finding their exit at the rear end of the furnace. It will be observed that the tubes receive the most intense part of the heat, and absorb the larger amount of it before it reaches the drum, consequently the drum is not subjected to the same destructive forces that it would otherwise be, and therefore there is scarcely a possibility of a disastrous explosion of the drum. Out of the many hundreds of thousands of horse-power of boilers of this class that have been built since their introduction by Dr Alban, in 1840, we do not know of a single instance of an explosion of one of these drums.

Under the rear row of headers is placed a mud drum, usually 18 inches in diameter, connected to the bottom headers by short nipples. This drum serves to collect the sediment floating in the water, and hold it until it is blown off.

Long narrow cleaning doors are built in the side walls of the brick setting, through which a hose with a steam nozzle may be inserted, for the pur-

FIG. 3.

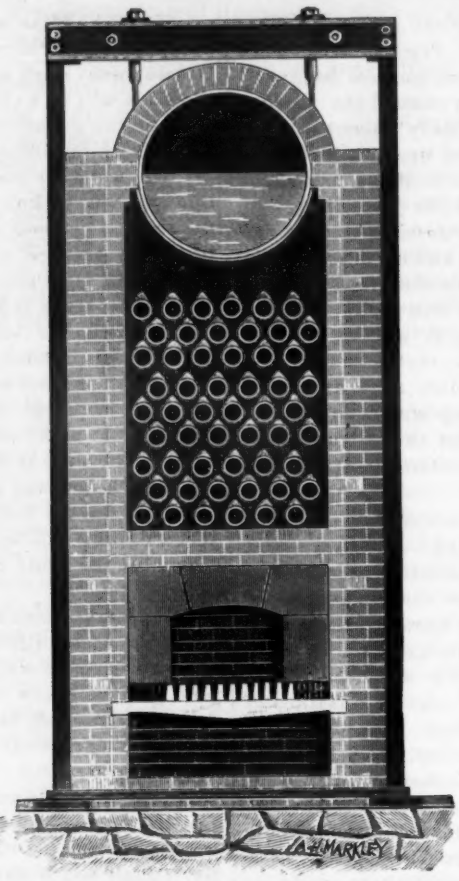


FIG. 4.

FIG. 5.

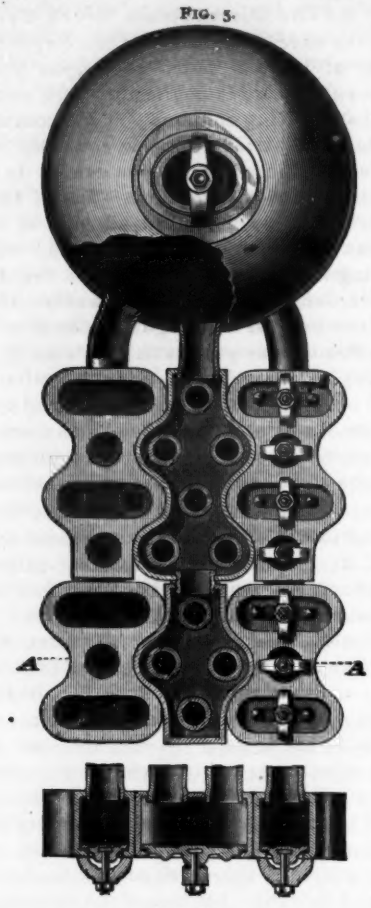
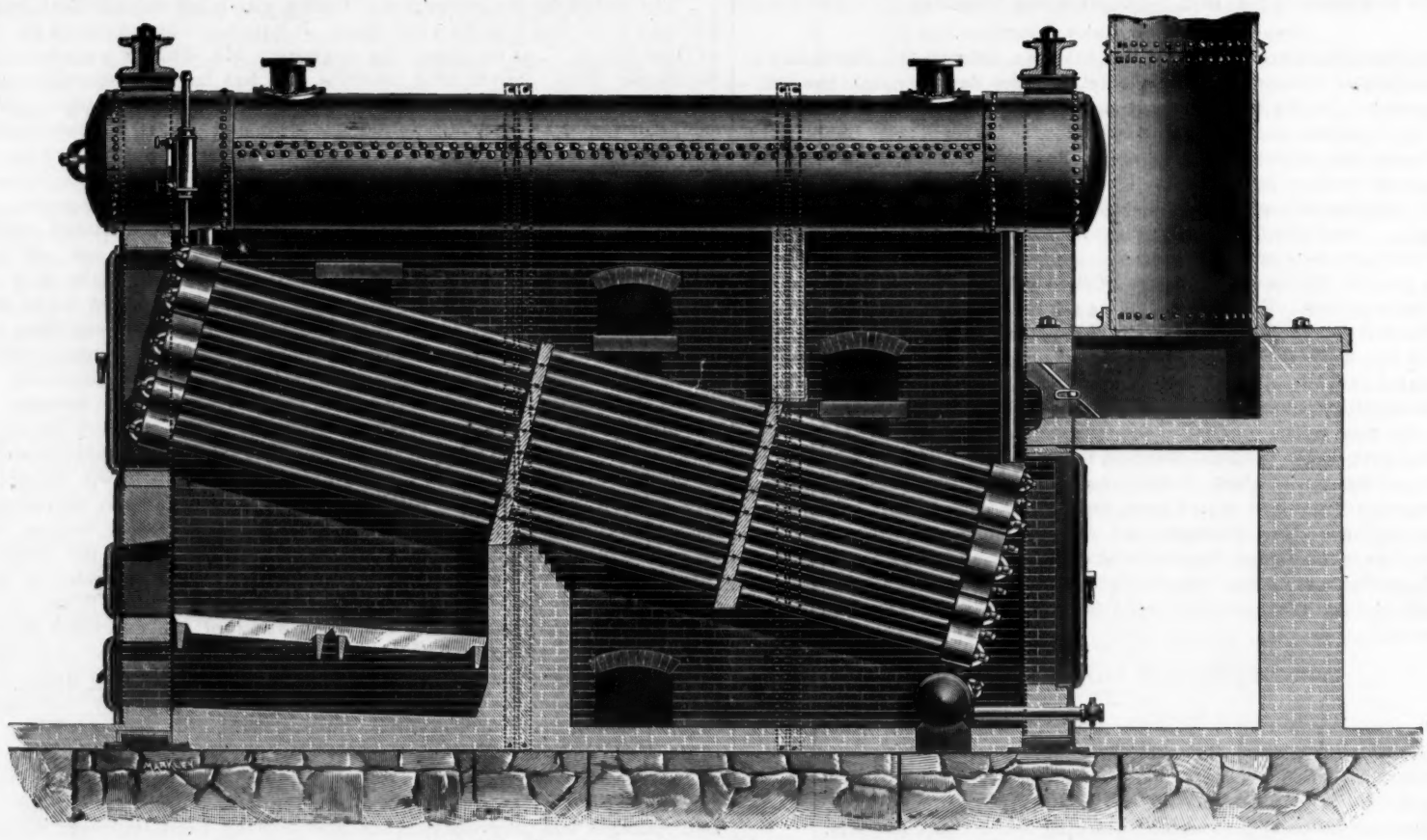


FIG. 6.



GILL WATER TUBE STEAM BOILER, WITH IRON STACK.

pose of blowing off the dust which gradually settles on the tubes. Two or three man-hole doors are also built in the side walls to allow an operator or inspector to enter the furnace above and below the tubes for cleaning or inspection. The furnace is built with an opening the full width of the furnace and the full height of the bank of headers, at both the front and rear of the tubes. Large doors are used to close these openings so as to prevent as much as possible the loss of heat. Upon opening these doors access is had to all the sectional parts without the necessity of entering the dusty furnace.

The illustration, Fig. 5, shows a bank of Gill's patent headers and a steam drum, with their connections. The column at the left hand shows a five and six-hole header with the caps removed, and the curved tube connection with the steam drum. The column at the right shows a five and six-hole header, with their inside hand-hole caps, bolts and dogs in place The middle column shows a four and six-hole header—in section at the middle of the headers—showing the manner of connecting the headers with each other, and the headers with the steam drum. The small illustration, Fig. 6, at the bottom,

FIG. 7.

shows a section through the three headers and four tubes, at the line A A. Fig 7. shows a pair of five tube headers, with five tubes, the hand-hole caps and the short nipples in place.

Hand-holes are provided in the headers at the front and rear of all tubes through which a scraper (having a long, straight and firm handle) is used to remove any sediment or scale that may have lodged in the tubes or in the headers. The tubes may also be removed through these hand-holes when necessary and new ones inserted. The openings are closed with caps placed inside of the headers. They are packed with thin rubber gaskets and are held in place with bolts one inch in diameter. The outward pressure of steam against these caps helps to make a tight joint, and should it be possible to break these bolts the pressure of steam would hold the caps in place and thus prevent the accidents that frequently occur with other water tube boilers which use outside caps, held in place only by the bolt, viz: the breaking of the bolts, blowing off the caps, scalding the firemen and other persons that may be in the boiler room.

A man hole is placed in the steam drum, by which it may be entered and cleaned. In this way every portion of the internal surface of the boiler may be reached and thoroughly cleaned from scale. The frequency of cleaning will depend entirely upon the character of the water used. With some waters occasional blowing out of the mud drum is all that is needed, but with bad waters, containing much carbonate or sulphate of lime, cleaning may be required once a month or oftener. Where the water is bad a good purifier will be found very serviceable, a good heater should always be used.

The furnace used with the Gill boiler may be of any kind that is used with any other boiler. The kind to be used will vary in different cases, according to the kind of fuel to be used. The boiler is especially adapted to the use of gaseous fuel and to automatic stoking. A structural frame work, composed of wrought iron I beam columns, and channel bar cross beams, firmly united with brackets, bolts and rods is erected, within which the drums, tubes and headers are suspended. The drums are supported in swings that are not attached to the drums, thus allowing the working parts to expand and contract independently of the structural parts. All the iron work is made complete before the brick work is commenced. The cast iron front, full height and width of the structure, is made in sections, and so united as to allow of free expansion to all the parts. The fire and ash doors have openings which are provided with wickets to control the admission of air to the furnaces. Although very plain, it is neat in design, as will be seen by reference to the illustrations.

Following is a comparison between a Gill water tube and a return tubular boiler:

GILL WATER TUBE BOILER.

Shell 42 inches diameter by 20 feet 6 inches long, one-half being exposed to the heat gives	100 sq. ft.
54 tubes 17 feet long gives	961 sq. ft.
Total heating surface	1,061 sq. ft.
Less 25 per cent. of the tubes when covered by ashes	240 sq. ft.
Total available heating surface	821 sq. ft.

RETURN TUBULAR BOILER

The shell of the tubular boiler, 4 feet in diameter by 17 feet in length and taking 60 per cent. for exposure to the heat, gives	130 sq. ft.
Add to this the heating surface of: 34 tubes 4 inches diameter	566 sq. ft.
Total heating surface	696 sq. ft.
Less one-half of the tubes (the bottom half being covered with ashes)	283 sq. ft.
Total available heating surface	413 sq. ft.
The non-available heating surface having been eliminated, eight square feet will produce a horse power, this makes the return tubular boiler	51 horse-power
and the Gill water tube boiler	102 " "

It will be seen that a 50 horse-power tubular boiler requires exactly the same ground space that may be occupied by a 100 horse-power Gill water tube boiler. Both boilers are four feet wide, and the side walls 18 inches, making the full width of the brick work seven feet. The length of the setting depends on the length of the tubes, and is about three feet longer than the tubes, with either type. Fig. 2 shows a nest of seven four-inch tubes as arranged in the water tube boiler with a space of three inches between the tubes; this space never changes, as the ashes do not collect on the sides of the tubes. When the ashes are not blown off with a steam jet, they will accumulate in a wedge shape, as shown in the three tubes at the right of Fig. 1, rendering 20 to 25 per cent. of the surface of the upper part of the tube ineffective. It will be apparent upon examining Fig. 1 and Fig. 4 that the passage way for the moving of the gases will always be open and free. In a boiler of 100 horse-power, this space is four feet wide, less the space occupied by six tubes four inches in diameter, which equals two feet, one half the width of the furnace; this multiplied by seven feet, the length of the furnace, makes the full passage way 14

TWO 450 H. P. BOILERS ARRANGED IN ONE BATTERY.

square feet. This passage way is so large that if the flame should go out at times, the gases will again ignite by a flash from the furnace. Fig. 2 shows a nest of eight 4-inch tubes as arranged in the ordinary tubular boiler; this arrangement is again shown in Fig. 3 with a space between the tubes usually from one to one and a-half inches. The four tubes at the right of Fig. 2 and all the tubes in Fig. 3 show an accumulation of ashes in them. Every person that had to do with boilers of this kind has undoubtedly seen tubes filled with ashes as much as this illustration represents. The majority of engineers having charge of boilers of this description have their tubes blown out and scraped frequently, and seldom allow their tubes to get into such a bad condition; yet it must be admitted that, upon examination, the average normal condition of the tubes will show them partially filled with ashes, rendering the lower half, or 50 per cent. of the tube, worthless as heating surface. It will also be observed that all the gases have to pass through the tubes. The total area of 34 4-inch tubes in the 50 horse-power boiler is but 2.96 square feet, or 5.92 square feet in two boilers aggregating 100 horse-power. This will be reduced at least 20 per cent. by the ashes in the tubes, making the available passage way only

4 4 square feet for a 100 horse-power boiler. It will be readily seen that when this space is divided into 68 parts (the number of the tubes), the flame cannot pass very far into the tubes before it will be extinguished, when combustion must cease.

In Fig. 1. the tubes in the Gill boiler are all shown having a thick scale formed inside of the tubes. By removing the caps at each end of the tubes, a scraper may be pushed through them and all the scale removed, making the boiler as efficient as when new. Should the scale be so hard as to resist the effects of the scraper, a quantity of caustic soda can be put into the boiler and boiled for several hours before removing the hand-hole caps; this will soften the scale so that it will no longer resist the scraper. This process is so simple and easily performed and without having to enter the furnace, that a good engineer will not allow his boilers to get into the condition shown in the figures. In ordinary practice it will be found that the removal of the lower course of caps and the caps in the mud drum will be all that is necessary for cleaning the boilers.

Fig. 2 shows the scale formed on the outside of all the tubes of a return tubular boiler and the passage way (for the steam and water) up through and between the tubes almost closed and the circulation of the water almost stopped. The efficiency of the heating surface is destroyed in proportion to the thickness of the scale.

The Stearns Manufacturing Co., of Erie, Pa, having long enjoyed a high reputation for manufacture of the best quality of other types of boilers, and being determined to keep abreast with the times, have secured the patents, patterns, drawings and good will of the inventor, Mr. John L. Gill, Jr., of Philadelphia, and also engaged his services to conduct the engineering and contracting part of the business.

ELECTRIC DRILLING IN THE BED OF THE MISSISSIPPI.

Undoubtedly the rock drilling that has been done by electricity in the bed of the Mississippi river, between Rock Island and Moline, Ill., signalizes the completion of the largest contract of the kind thus far undertaken. The electric drilling at Rock Island was done under the terms of a contract made with the Government of the United States by the Thomson-Van Depoele Electric Mining Co. The Government, which owns Rock Island, has for some time been engaged in the work of deepening a portion of the southern channel of the Mississippi. This is done with the two-fold purpose of securing a more plentiful supply of water power, which is used at the shops on the island, and to provide a navigable channel at Moline.

A coffer-dam was erected at the head of the island at a cost of about $25,000, and the Government is now deepening a channel 400 feet wide to the extent of four feet. The particular portion of the work on which electricity was employed is a strip of limestone 600 feet long, with an average width of 50 feet. The remainder of the rock is a much softer sandstone, and can be profitably drilled by hand. It has been shown, however, that electric power only costs about half as much as hand drilling in the harder rock. Nine drills were used on the work. Eight of these were mounted on weighted tripods in the usual manner, while one, somewhat larger in size, was mounted on a carriage and wheeled about on a temporary track. The machines used were the regular Van Depoele reciprocating drills.

The current was obtained from a plant near the pumping station, the 25 H. P. engine of this latter being used. The generating plant consisted of dynamos 20 and 10 kilowatts capacity.

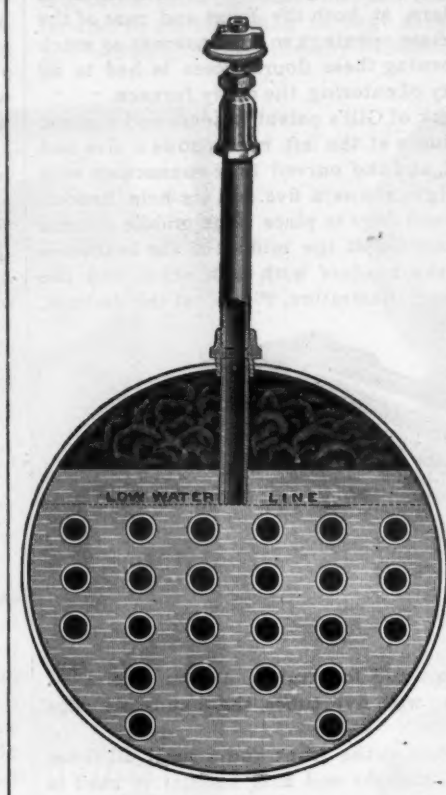
As to the practical and commercial results of the operation of these drills. The contract required that as many holes as were necessary should be drilled in the limestone rock to a uniform depth of four feet. The holes were made 1¾ inches in diameter at the top and 1½ inches at the bottom, drills of three different lengths being used. Work was begun on October 23, and on December 19, 941 holes had been drilled, many of them exceeding by two or three inches the specified depth. This represented 3,764 feet of drilling. The whole number of nine drills was not employed until the latter period of the work, however, and a carefully kept record showed that at the date mentioned the work had taken 1,085 drill hours. This gives an average of 3.6 feet per hour for each drill.—[Western Electrician.

The Radford Pipe & Foundry Company.

In the issue of *The Iron Trade Review* of September 17, 1891, was an article calling attention to the business of the Radford Pipe & Foundry Co. and their extensive plants in Radford, Va., and Anniston, Ala. The statement was made, that on the completion of the Radford plant the company would be in good shape to turn out in all some 350 tons of pipe per day, and by working extra time could make 400 tons per day. The plant in Radford is now complete and in full operation and has thus far been turning out some 75 tons of pipe daily, and in a run of four days only lost three lengths of pipe. This is considered a very good showing for the amount of pipe turned out and for an entirely new plant. If with the two plants this company is enabled to turn out the amount of pipe as noted in the article refered to, it will make them one of the largest, and possibly the largest manufacturers of pipe in the country and put them in a position to fill orders very promptly. This company makes many sizes of pipe for water, gas and steam purposes. At the time the September article was written the company had orders on their books for some 5,200 tons of pipe, and so far as known, the business has kept up. The workmen in the employ of this company can own their own houses; the land company in the place donating the lots, building the houses and giving each his own time to pay for it. Beside their pipe works this company has also a large foundry where are made all kinds of castings. The Radford Pipe & Foundry Co. can be congratulated in having two such large and perfect plants in which to carry on their business with every degree of success and profit to all interested parties. J. P. G.

VAN AUKEN'S FUSIBLE LOCKED SAFETY ALARM.

The Van Auken Steam Specialty Co., 201–207 South Canal street, Chicago, who have attained a wide reputation through their superior automatic valves, have latety brought out a locked safety fusible alarm for indicating low water in steam boilers, which we herewith illustrate. A glance at the accompanying cut shows the device as attached to a steam boiler. The shell is tapped three-quarter inch; a one-half inch pipe is run down within two or three inches above the top of the flues or crown sheet. When the water in the boiler lowers to this point the steam will pass up in the device and melt the fusible disc, giving notice to the engineer that the water is near the danger line. This fusible alarm is not melted out by fire, as in many old styles, but is melted out by steam acting on a fusible alloy which melts at 240 degrees. This alarm is not prevented from working by any accumulation of scale or foreign substance in the boiler. No stopping of power is necessary by the use of this alarm, for when the disc is melted out the escape of steam can then be shut off and a new disc put in. The alarm is self-locked and can not be tampered with under any circumstances, and has no keys to be carried around to be lost or stolen. It is provided with a valve between the fusible disc and boiler which can only be closed when the disc is melted out. The device can only be locked when the disc is in and the valve open. The valve can not be closed or the disc removed until the latter is melted out by steam passing up in the device. There are no working parts about the device, and consequently, it is always ready for action.



A New Coating for Metals.

To protect metalwork and woodwork from the effects of the weather or of water a coating is recommended by *Wochenschrift des Niederosterr, Gewerbevereines*, which is based on the remarkable adaptibility of cottonseed oil to unite with lead. The process of manufacture is as follows: five liters of cottonseed oil are placed in a metallic vessel, and 10 kilogrammes (22 lbs.) of lead are smelted separately in an iron ladle. When the lead is perfectly molten, which requires a temperature of about 335°, it is poured gradually into the oil, under continual stirring, so that every particle of the lead may be subjected to the action of the oil. The mixture is then allowed to cool. When the oil is poured off, the lead will be found at the bottom, but reduced in weight to 8 5 kilogrammes (18 7 lbs). The remaining 1½ kilogramme (3 3 lbs) has, therefore, been absorbed by the oil. The rest of the lead then undergoes the same process, by which the oil will again take up 1 kilogramme (2 2 lbs.) of the metal. When the operation has been repeated five times the net result will be that the oil has absorbed fully 5 kilogrammes (11 lbs) of lead, which appears to be the maximum impregnation obtainable. When quite cold the oil has the appearance of thick varnish, and is ready for application, either with a brush or a sponge. This coating unites quickly and firmly with any material. The first coat should be allowed to dry 48 hours before the second is administered. It has not yet been definitely ascertained whether cottonseed oil would not also assimilate with other metals; but it is certain that other oils either do not possess at all, or only in a very limited degree, the property of lead absorption.

World's Fair Notes.

Water for the Exposition grounds will be supplied from two pumping stations having a combined capacity of 64 000,000 gallons a day. The largest of the two has a capacity of 40,000,000 and constitutes the exhibit of the Worthington Pump Co., which puts in the entire plant, costing $250,000, free of expense to the Exposition.

The ceremonies attending the dedication of the Exposition buildings, October 11, 12 and 13, 1892, are to be very elaborate and impressive. The committee having the matter in hand will devote $300,000 to that purpose. It is expected that the President of the United States and his Cabinet, many of the Senators and Congressmen and Governors of the States, numerous representatives of foreign governments, and 10,000 militia and several thousand regulars will be present. A dedication ode and marches, written for the occasion, will be rendered with full choral and orchestral accompaniment. Patriotic and other music, a dedicatory oration, a pageant of symbolical floats representing the "Procession of the Centuries," and magnificent displays of fireworks will be among the chief features of the programme.

Mannesmann Tubes.

The annual report of the Mannesmann German Austrian Tube Works for the past year shows that the value of the material produced was £157,800, and that a profit of £68,400 had been made. The important question as to how certain sorts of Thomas steel could be used in the manufacture of Mannesmann tubes has been solved, which will tend to still further develop the usefulness of this process of tube making.

A NEW DRILLING MACHINE.

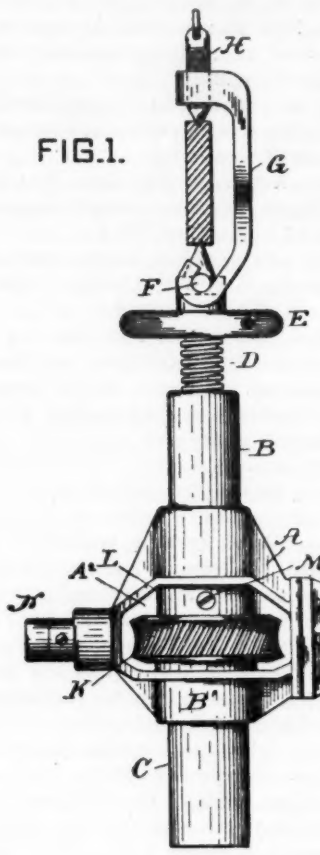
The machine herewith shown (letters patent for which were issued to Wm. W. Varney, 1001 Harlem avenue, Baltimore, Md., December 22, 1891) was designed for shipbuilding, boiler and bridge work and to be driven with electric motor mounted on trunnions or a swiveled stand. The object of this invention is to produce a drilling machine which will be light, compact, and simple in its construction, in which the drill stock will have in two directions movement, so that it may be operated in various positions, and the driving shaft so arranged that the drill stock may be operated at various distances from the source of power without moving said source of power, and by means of which the drill may be thrown into or out of motion readily without interrupting the driving mechanism, and the said stock allowed to slip or rotate independently of said driving mechanism, if the drill should become jammed or stopped, so as to prevent injury to the tool or the mechanism of the machine.

Fig. 1 represents a front elevation of the drill-stock frame detached from the main frame, showing also the drill stock, worm gear wheel and supporting dog holding the device to a supporting beam or timber. Fig. 2 represents a view, partly in vertical section, showing the drill stock frame at right angles to the position represented in Fig. 1, and the main frame and driving gear in connection therewith. Fig. 3 represents a top view of a portion of the machine, showing the dog whereby the machine is held in position.

The operation of this machine is as follows: The device being secured in position, as shown in Figs. 1 and 2, power applied to the shaft P′ is transmitted through the telescopic shafts and intermediate gearing to the tool-stock. When it is desired to stop the drill, the rod Y is turned to release the friction-clutch mechanism, consequently stopping the motion of the drill-stock without stopping the driving mechanism. The friction-clutch also slips in case the drill meets with an obstruction, thus preventing injury thereto or to the operating mechanism. When drilling downward in a vertical position or at an angle, the dog G is employed to prevent the drill and the machine from dropping when the work is finished. In drilling in other positions the dog may be removed, as it is not necessary.

It will be perceived that the frame A has a swinging motion on its trunnions or journals, so that the drill may be worked at any angle, and the main frame and driving mechanism may be moved around the driving-shaft, thus permitting the drill to have a universal movement with relation to said driving-shaft, which enables it to be operated in any desired position to said driving-shaft, and at an angle thereto without either moving said driving-shaft or the source of power.

FIG. 1.



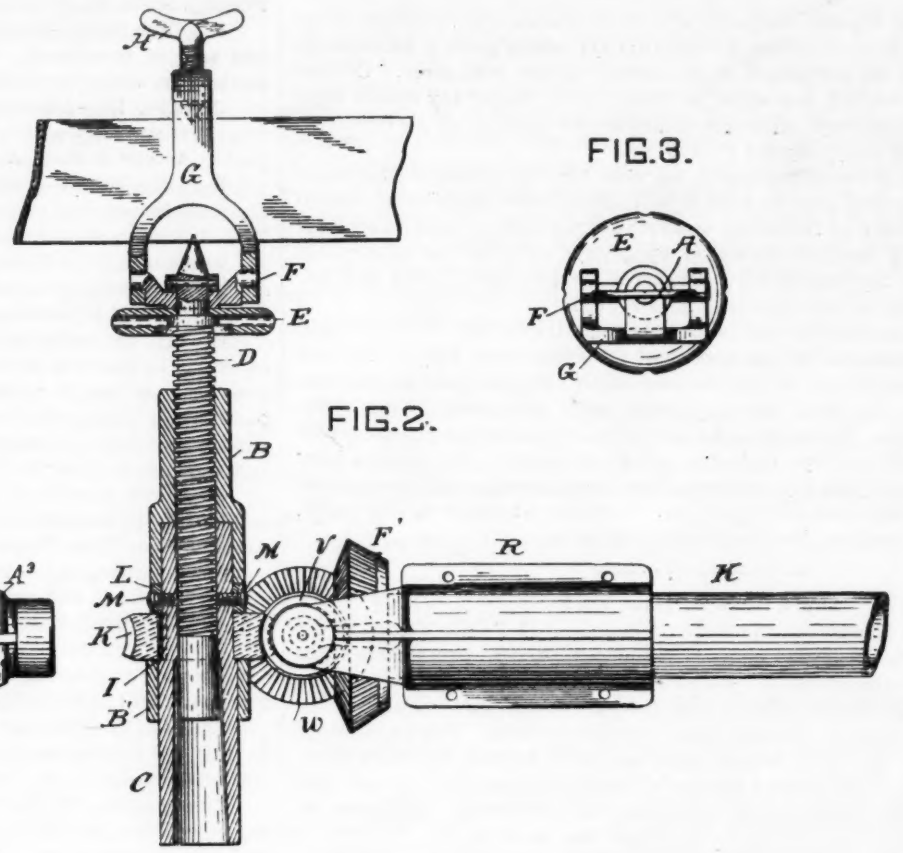


FIG. 2.

FIG. 3.

A NEW DRILLING MACHINE.

SOUTHERN BUSINESS DEPRESSION.

The fact that a few days ago cotton sold lower than it has at any time since 1849, is causing considerable anxiety among business men throughout the South. It is stated that the present price of cotton hardly covers the cost of raising and leaves the planter little or nothing over the cost of seed and supplies. This means loss to local factors and merchants, a falling off in trade and increasing difficulty in making collections. Taken altogether, the prospect is anything but an encouraging one for the South, and in addition to threatened troubles from the depressed cotton trade, that section of country is now feeling the effects of other evils.

During the past year or two innumerable boom towns have sprung up throughout the South. Large manufacturing and business enterprises, the majority of which were merely on paper, have been started to build up new towns. The price of real estate went up rapidly, and town lots were bought at rates far above their actual value. Even in the best of these new towns, where business enterprises were begun on a solid foundation, there came a time of settlement, the difficulties of which are now becoming apparent. Industrial enterprises when started under the most favorable circumstances necessitate large and continued expenditures, and it takes but a comparatively short time to test the solidity of such ventures. No one will attempt to deny the great material progress of the South during the past few years, but that progress brings demands which must be met, and which will result disastrously to mushroom towns and unstable manufactories.

As one effect of the injudicious building of furnaces and mills and the depreciation in values, it is stated that capitalists are again turning to the Lake Superior iron ore fields, and are curtailing Southern investments. A paper published in the Lake Superior region is authority for the statement of one case in point. It is said that a Virginia property, including iron mines and furnaces, is now being managed by a practical man from the Lake Superior region. The concern, it is stated, has abundant capital, and has been stocking iron until it has accumulated a large amount. There is not a demand for this grade of pig at what is to the company a reasonable figure. The manager says if freight rates could be so reduced that about 25 per cent. of Lake Superior ore could be used in the manufacture of pig they would be able to dispose of the pig, but as it is, the product from local ores is unsaleable at a price which would yield the company a living profit. This manager is reported as expressing the opinion that the day is not far distant when there will be a general collapse of furnace and mining industries all along the Southern line, and in support of such belief he has tendered his resignation to the company, not desiring to be identified with a losing venture.—[American Manufacturer.

An Electro-Magnetic Hammer.

Some attention has been directed to a proposed substitute for the ordinary steam hammer, viz.: an electro-magnetic hammer, in general design similar to the steam apparatus—the novelty in this case consisting in the substitution of electro-magnetic power for that of steam by a slight and very simple modification of the usual mechanism. The piston is of magnetic material, and the cylinder is composed of a series of coils, through each of which an electric current may be passed separately; the passage of an electric current through the coils forming the upper part of the cylinder raises the piston into the magnetic field thus created, and, by cutting off the current and simultaneously transferring it to the lower coils of the cylinder, the piston is released; its descent being accelerated by the magnetic attraction created below. As a magnetic field can be produced in any of the series of coils, the blow may of course be readily shortened or lengthened as desired; and the current is controlled by levers and connections identical with those used on an ordinary steam hammer—in fact, the absence of the steam pipe is the only feature distinguishing this new machine from the common steam hammer.—[Safety Valve.

A Coke Works Equipment.

According to the *American Manufacturer*, the following is the material necessary to construct, and the tools, equipment and supplies necessary to operate 100 coke ovens one year: Fire brick—130,000 crown brick, 270,000 lining brick, 13,000 tiles, 2,400 14-inch brick, 200 skewbacks, 100 tunnel heads, 800 jambs; T rails, 15 tons; 1-inch gas pipe, 1,500 feet; scraper pipe, 150 feet; 35 globe valves for 1-inch pipe; round iron for 150 bridles, and 100 feet of 1-inch for scraper tubs; 35 wheelbarrows, 70 scrapers, 35 coke forks, four shovels, 250 feet 1¼-inch hose, one larry, two horses, two sets harness, one cart, 1,000 feet 2-inch oak plank.

OUR WONDERFUL FOREIGN TRADE IN 1891.

The Bureau of Statistics of the Treasury Department has just published the statistics of our foreign trade for the calendar year 1891. The figures are full of encouragement. The grand aggregates presented for the year have never been equaled in our history. The first year's experience under the McKinley tariff completely refutes the charge of its enemies that it would cause a shrinkage in our foreign trade. It has had precisely the opposite effect.

The value of our imports of merchandise for the twelve months ending December 31, 1891, was $828,312,646, an increase of about $5,000,000 over the value of the imports for the twelve months ending December 31, 1890, during which latter year our imports were greatly increased because of unusually large importations in anticipation of the enactment of the new tariff law. The average annual value of our imports for the ten years from 1881 to 1890, inclusive, has been $701,862,430. Our imports for the calendar year 1891 exceeded this average for the ten years by the sum of $126,450,216.

The value of our exports of merchandise for the calendar year 1891 was $970,506,282, which is much in excess of any prior year. The value of our exports for 1890 was $857,502,548, and in 1889 it was $827,106,347. The value of our exports in 1891 exceeded that of 1890 and 1889 by the sum of $113 003 734 and $143 399,935, respectively, and it exceeded the average annual value of our exports for the ten years from 1881 to 1890, inclusive, by the sum of $206,563,150.

The value of our exports for the month of December, 1891, attained to the unprecedented and remarkable sum of $119,932,532, which greatly exceeds the value of the exports for any month in the history of our commerce. Our exports have never reached the value of $100,000,000 during any month until October and November, 1891, when the values of the exports of merchandise were, respectively, $102,877,243 and $110,103 536.

If a comparison of our exports with imports for the month of December and for the calendar year 1891 be made it will appear that the value of the exports during the month of December was $119 932,532, and of imports $69,444,655, or an excess in favor of exports of $50,487,877, and that the value of our exports for the year 1891 was $970,506,282 and of imports $828,312,646, or a balance of trade in favor of our exports of $142,193 636.

If the value of our exports and imports be combined it will be found that our total foreign commerce for the month of December was $189,377,187, and that our imports and exports for 1891 amounted to $1,798,818,928, an increase of $117,918,654 over the total foreign commerce of 1890, when it was of the value of $1,680,900,274. The average annual value of our foreign commerce for the ten years from 1881 to 1890, inclusive, was $1,465,805,561. Our foreign commerce for the calendar year 1891 exceeded the annual average for the ten years mentioned by the large sum of $333 013 367. So much for the McKinley tariff! —[Bulletin of the American Iron and Steel Association.

The Canals of New York

Superintendent Hannon, of the State Department of Public Works, in his annual report for the fiscal year ending September 30, 1891, emphasizes State Engineer Bogart's observations concerning the dangerous condition of the aqueducts of the Erie Canal, stating that the only obstruction to navigation during the year have been through their partial failures. The expense of operating the State system of canals, with ordinary repairs, has been $747,079 43 Much of the work covered by special appropriations is computed, and the remainder is progressing as fast as practicable. A further appropriation of $15,000 for the completion of the Forrest Port dam is called for.

The whole number of tons of freights carried upon the canals of the State during the season of navigation was 4,563,472, and was composed of the following described class of articles: Products of the forests, 1,206,986; agriculture, 1,171,192; manufactures, 109 387; merchandise, 250,083; other articles 1,825,824. Of the total amount of freight moved 3,190,331 tons were carried East and 1,373,141 tons were carried West; and of this amount 2,651,838 tons were through freight, and 1,911,634 tons were way freight. Compering the tonnage of 1891 with that of 1890, there is shown to be a loss of 682,630 tons, but during the year 1890 much ice was transported upon the canal, so that the loss last year, as compared with the tonnage of last year (exclusive of the ice) is 215,093 tons.

Mr. Hannon says that the present system of lengthening locks is insufficient as a mode of increasing the usefulness of the canals, and that future improvements should be made with a view to enabling boats with much larger cargoes to be navigated upon them, and with a further view to a more rapid delivery of cargoes between the points of production and consumption, which also involves an increase in the motive power for the propulsion of boats over that which is now used upon the canals.

The only profits made by carriers on the canals has been made by those of them that operated steam canal boats. Of these 60 were employed last season.

Manganine: A New Alloy.

Manganine is the name of a new alloy, consisting of copper, nickel and manganese, which has been brought on the market, says *Iron*, by the German firm, Abler, Haas & Angerstein, as a material of great resisting power. The specific resistance of manganine is given as 42 microhm centimetres, hat is, higher than that of nickeline, which has hitherto passed as the best resisting metal. Another advantage of manganine is its behavior under variations of heat, the resistance, it is claimed, being affected only in a minute degree by high temperatures. It is therefore adapted for the manufacture of measuring instruments and electrical apparatus in general, which are required to vary their resistance as little as possible under different degrees of heat. A further interesting fact is that while other metals increase their resistance by the raising of the temperature, that of manganine is diminished.

INDUSTRIAL SUMMARY.

New Enterprises:—

The following recent incorporations, specially reported for *The Iron Trade Review*, are of interest to the iron and machinery trade:

Chicago, Ill.—Speedy Cycle Manufacturing Co.; capital, $50,000; to manufacture bicycles; incorporators: Harry J. Winn, Sidney H. Percy, Wm. A. Doyle.

New London, Wis.—Andrea Manufacturing Co.; capital $20,000; for manufacturing screen doors, etc.; incorporators: H. G. Andrea, W. H. Hatten, Jas. Meiklejohn.

Milwaukee, Wis.—Milwaukee Gem Castor Co.; capital, $5,000; for manufacturing condiment castor and other novelties; incorporators: C. J. Lange, H. Osten, J. P. Shubert.

Belleville, Ill.—Snyder & Baker Stove Works; capital, $20,000; to manufacture stoves, ranges and castings; incorporators: Joseph Baker, Albert J. Baker, Frank J Snyder.

Oconto, Wis.—Standard Lamp & Motor Co.; capital, $50,000; for manufacturing incandescent lamps, motors and dynamos; incorporators: F. H. Pietsch, E. L. Oppeman, F. B. Davis.

Lansing, Mich.—The Michigan Wheel Co.; capital, $100,000; to manufacture and sell carriage wheels, etc.; incorporators: U. H. Forester, S. H. Row, Frank J. Stahl, all of Lansing, Mich.

Bay City, Mich.—Marine Iron Co.; capital, $32,000; for the manufacture and sale of machinery, boilers, etc.; incorporators: Benj. Boutell, Jno. H. Davis, Wm. Burnett, all of Bay City, Mich.

Chicago, Ill.—American Electrical Co.; capital, $500,000; to manufacture, buy and sell all kinds of electrical devices; incorporators: Eben Carpenter, Arthur B. Eads, Alonzo F. Connolly.

Bay City, Mich.—Bounette Av. Lawn Sprinkler Co.; capital, $30,000; for the manufacture and sale of lawn sprinklers, etc.; incorporators: C. F. Lovell T. C. Bounette, A. S. Gidqual, all of Bay City, Mich.

Pittsburgh, Pa.—United Steel Co.; capital, $1,000; for manufacturing iron or steel or both, etc., incorporators: Geo. B Motheral, Allegheny, Pa.; Ernest W. Beach, Winfield B. Carson, both of Pittsburgh, Pa.

Goshen, Ind.—The Goshen Machine & Foundry Co.; capital, $12,000; to carry on the business of manufacturing machinery and iron founders; incorporators: Arthur E. Brownell, Jas. M. Wisler, Wilber Stonex.

Detroit, Mich.—Kinney Disinfectant Co.; capital, $50,000; for the manufacture and sale of disinfectant machinery appliances, etc.; incorporators: David D. Buick, Jesse Kinney, Geo. W. Busch, all of Detroit, Mich.

Cleveland, O.—The Winton Bicycle Co.; capital, $25 000; for manufacturing and dealing in bicycles, bicycle goods, etc.; incorporators: Geo. H. Brown, Alex. Winton, Thos. Henderson, Fred. McNess, Gustave A. Ruetenik.

Connersville, Ind.—Ansted & Higgins Spring Co.; capital, $30,000; for the manufacture and sale of wagon and carriage springs; incorporators: Edward W. Ansted, Kate E. Ansted, Amos Ansted, Michael Higgins, Jr.

Catasauqua, Pa.—Hunter Steel Co. (incorporated in W. Va.); capital, $250,000; for converting iron into steel, also raising low steel into high steel; incorporators: J. W. Fuller, Jas. Thomas, Wm. W. McKee, Catasauqua, Pa.

Chicago, Ill.—Chicago-Rockford Co.; capital $250,000; for manufacturing, buying and selling machinery, goods and fabrics made of cotton, wool and other materials; incorporators: G. H. Curtis, Hollis M. Chase, L. H. Wilson.

Chicago, Ill.—The Columbian Cycle Co.; capital, $500,000; to manufacture and sell cycles, buy, perfect, manufacture and sell new and useful mechanical devices; incorporators: James M. C. Tyner, George D. White, Cyrus H. Lochard.

Rockford, Ill.—The Eclipse Novelty Co; capital, $10,000; for the manufacture and sale of lawn mower sharpeners, skate sharpeners and like articles and novelties; incorporators: L. B. Garrett, A. M. Bachelder, Robert Garrett.

New York, N. Y.—M. S. Godfrey Co.; capital, $25,000; for the manufacture and sale of railroad supplies; incorporators: Maculey S. Godfrey, 145 Broadway; Dan. B. Horton, 319 Broadway; Fredrick H. Hitchcock, 13 W. 46th street.

New York City, N. Y.—Datton Grinder Co.; capital, $30,000; for the manufacture and sale of machines for sharpening knives; incorporators: R Datton, New York, N. Y.; A. J. Tracy, 43 W. 45th street, Bayonne, N. J; C. B. Davis, Higganum, Ct.

Cleveland, O.—The Cleveland Cooperage Co.; capital $50,000; for manufacturing and dealing in barrels, and other casks, boxes, etc.; incorporators: August P. MacDonald, John G. Weigel, Thomas G. Robinson, Frank L. Robinson, J. L. Barnard.

Chicago, Ill.—The Eagle Machine Works; capital, $6,000; to manufacture and sell machinery and tools, and do a general jobbing and repair business on all kinds of machinery and tools; incorporators: Herman A. Knoke, V. Desallioud, E. E. Barrett.

Chicago, Ill.—The Mosher Arc Lamp & Manufacturing Co; capital, $25,000; to manufacture electric arc lamps, switches, cut-outs and other electric appliances pertaining to electric lighting; incorporators: J. M. Fisher, J. A. Mosher, G. W. Carpenter.

East St. Louis, Ill.—The Standard Engineering Co.; capital, $250,000; for erection of steam plants and waterworks, and sale of boilers, engines and all mechanical appliances in that line; incorporators: Philip Ross, Geo. W. Candle, Henry C. Withers.

Des Moines, Ia.—Kenyon Bicycle Manufacturing Co.; capital, $25,000; for the purpose of manufacturing, renting, repairing and selling bicyles, tricycles, tools, etc.; incorporators: Readhead Norton, Lathrop & Co., E. D. Kenyon, A. B. Edmunds, Des Moines, Ia.

Chicago, Ill.—The Cochran Dishwashing Machine Co.; capital, $250,000; for the manufacture of the Cochran and any and all kinds of dishwashing machinery, with or without power, buy and sell same and do general mercantile

THE ÆTNA MEDIUM & HIGH SPEED ENGINE
Manufactured by
THE TOTTEN & HOGG I. & S. FOUNDRY Co.
PITTSBURGH, PA.
150 to 2000 H.P. Latest Design
FOR ROLLING MILLS AND ALL OTHER WORKS WHERE LARGE POWER AND CLOSE REGULATION IS REQUIRED
CONTRACTS MADE FOR COMPLETE STEAM PLANTS.
ENGINES ALWAYS IN STOCK.

The Hackney Power Hammer

The Measure of Excellence and Profit.

The durability of the machine and the quantity—with quality—of work produced, is nowadays the measure of excellence and profit, and in this respect the "Hackney" is far in the lead.

It surpasses other power hammers in durability, speed and quality of work.

Write for catalogue and prices.

THE HACKNEY HAMMER CO.
Cleveland, O.

and manufacturing business; incorporators: Josephine G. Cochrane, L. J. Linphere, M. D. Tillotson.

Youngstown, O.—The Andrews & Hitchcock Iron Co.; capital, $400,000; for constructing blast furnaces, manufacturing pig iron, operating rolling mills, etc.; incorporators: C. H. Andrews, Wm. J. Hitchcock, Frank Hitchcock, Wm. J. Hitchcock, Jr., F. A. Simpkins.

Youngstown, O.—The Quantograph Co.; capital, $4,000; for the manufacture and sale of machines for mechanical adding, substracting, and to manufacture cash registers, etc; incorporators: Wm. T. McConnell, Augustus B. Cornell, Jno. H Clarke, Aug. A. Cornell, J. H. Hemler.

Chicago, Ill.—The Wilcox Water Heater Co.; capital, $100,000; to manufacture, sell and deal in hot water heating apparatus, and all kinds of domestic and culinary apparatus and devices; incorporators: Margaret A. Wilcox, Charlotte C. Robertson, Ira E. Wilbur, W. R. Onohundro.

Des Moines, Ia.—The Railway Automatic Time & Danger Signal Co.; capital, $100,000; for the manufacture and sale of a certain railway appliance known as a time and danger signal; incorporators: E. R. Hutchins, J. R. Gainn, N. Platt, R. E. Fitzgerald, N. Enguest, Des Moines, Ia.

New York City, N. Y.—The United Fire Alarm & Police Signal Co. (incorporated in W. Va.); capital, $1,000,000; for the purpose of manufacturing police and signal and fire alarm apparatus, etc.; incorporators: R. A. Morrison, Jno. L. Woods, Brooklyn, N. Y; E. M. Graves, Hartford, Conn.

Cleveland, O.—The Excelsior Machine & Cleveland Punch & Shear Works Co.; capital, $125,000; for the manufacture of rotary planers, power punchers, shears and doing a general forge and machine business; incorporrtors: E. I. Leighton, Chas. Hathaway, Jr., Chas. Hathaway, H. Fuller, W. D. Sayle.

OTHER NEW ENTERPRISES.

The National Hancock Rotary Plow Co. has been incorporated in Virginia. Capital stock, $100,000

It is understood that J. W. Pike will erect a factory at Amsterdam, N. Y. to manufacture knitting machinery.

The Bristol Iron Works, of Bristol, Tenn., have been organized, for the manufacture of wrenches, plows, etc.

The Phelps Manufacturing Co. has been incorporated at San Francisco, Cal., with a capital of $300,000, to manufacture iron, steel, etc.

The Barnett Manufacturing Co., of New York, has been organized for manufacturing packing for steam engines, etc. Capital, $5,000.

At Temple, Tex., the Rockland Plow Co. has been incorporated by G. E. Wilcox, J. E. Moore, A. M. Kellar and others; capital stock, $100,000.

The Dixon Power & Lighting Co. has been formed at Dixon, Ill; capital, $75,000; incoporators: F. A. Watson, A. C. Bardwell and F. A. Truman.

The Acme Boiler & Radiator Co. has been incorporated at St. Paul, Minn., to manufacture and deal in steam and hot water apparatus. Capital stock, $50,000.

The Malleable Iron & Steel Casting Co. has been organized at Batimore, Md., with a capital of $15,000 for the manufacture of malleable iron and steel castings.

The Seneca Construction Co., of Jersey City, N. J., has been organized with $300,000 capital stock, for the construction of bridges and other public improvements.

The Steel Cable Engineering Co.; capital stock, $100,000, of which $300 is paid in, has been organized, at Portland, Me., for the purpose of carrying on a general foundry business.

A company has been organized at Chattanooga, Tenn., to be known as the C. C. Howard Stove Co. J. H. Barnett, C. C. Howard and others are the incorporators. They will manufacture stoves.

Martin H. Dooly, B. S. Ivy and J. B. Withers will erect a brass foundry at Atlanta, Ga., under the firm name of Dooly, Ivy & Co. They propose to manufacture all kinds of brasses for engines, electric cars, etc.

The Holt Manufacturing Co. of Stockton, Cal., has been organized to manufacture cars by C. H. Holt, and F. S. Holt, of San Francisco; Benj. Holt, G. H. Cowis and Geo. Dickenson, of Stockton. Capital stock, $500,000.

The California Iron, Steel & Tin Plate Co. has been organized to operate in New Mexico and California. The incorporators are T. R. Gable, C. S. Hubbs, and Jas. Anthony, of Albrig, New Mexico. Capital stock $5,000,000

The Ohio Falls Power Co. has been incorporated at Louisville, Ky., with J. Proctor Knott as President; A. S. Willis, Vice-President, and George Du Relle, Secretary, to produce, distribute and sell power for mechanical purposes. The authorized capital stock is $1,000,000.

The Columbian Palace Car Co., of Chicago, has been incorporated with capital stock of $6,000,000, for the construction and operation of railway cars. The incorporators are Montgomery H. Throop, Jr., Allan C. Story, Alfred C. Brackenbush and George F. Westover.

The Columbia Car & Tool Works, of Portland, Ore., has been formed for the manufacture and sale of machinery, cars, etc. The capital stock of the company is $100,000. Henry Holen, H. H. Lovejoy, Leo Fried, and Maurel Heacock are the promoters of the project.

The T. J. Schaffer Manufacturing Co. has been organized with headquarters at Rochester, N. Y., to manufacture hydraulic machinery for the production of railroad ties, pails, etc. The capital stock is $125,000 and the incorporators are John D. Chamberlain, John T. Schaffer and Wm. M. Bennett, all of Rochester.

The Henry R. Worthington Co. has been incorporated at Elizabeth, N. J., with a capital of $3,500,000. The company will engage in the manufacture of hydraulic pumps and pumping machinery at Elizabethport and Brooklyn. The incorporators and stockholders are Charles C. Worthington, of Irvington; William A. Perry, of Bay Ridge; Horace G. Tarr, of Montclair; Josephus F. Holloway, of New York City, and Theodore F. Miller, of Brooklyn.

The following are among the recent Illinois incorporations: The Smokeless Fuel Co., of Chicago, to manufacture gas; capital stock, $2,000,000; incorporators, Herbert A. Brown, Sammuel E. Maddin and L. E. Dancey.—The Holly Steam, Heat & Power Co., of Chicago; capital $500,000; incorporators, James P. Oellers, Thomas H. Martin and Thomas Dorwin.—Hall Engineering Co., of East St. Louis, general contracting engineers; capital, $30,000; incorporators, Thomas V. Hall, John A. Henry and Frank H. Hoose.

Additions, Enlargements, Removals, Etc.:—

The Standard Iron Co. is improving its plant, at Martin's Ferry, O.

C. S. Atkinson has begun the erection of a new foundry at New Hope, Pa.

The recently burned Grove Fertilizer Works, at Perdix, Pa., will be rebuilt.

C. H. Hartshorne is building a one-story machine shop at Worcester, Mass.

The New Process Nail Co. has begun the erection of a plant at Torrington, Conn.

Frank H. Elson has broken ground, at New Haven, Conn., for a boiler factory.

The recently burned Lock Machine Works, at Bradford, Pa., will be rebuilt at once.

The Griffin Wheel & Foundry Co., of Chicago, has increased its stock to $350,000.

The Chicopee (Mass.) Manufacturing Co. will erect a new engine house at its plant.

The Central Iron Works Co. is to erect a $20,000 addition to its plant, at Steelton, Pa.

George M. Battey's recently burned machinery plant at Rome, Ga., is being rebuilt.

Alfred Tutts & Co. are reported as erecting an addition to their iron works at Algiers, La.

McCormick & Co. will continue to make additions to their plant, at South Harrisburg, Pa.

McDonald & Sons have started their iron foundry and machine shop at Wytheville, Va.

The engine house at Kendall, Hadley & Co.'s plant, at Goffstown, N. H., is to be enlarged.

A 90x90-foot addition will be built to Davies & Thomas foundry, at East Catasauqua, Pa.

It is stated that the Amboy shops of the Illinois Central are to be removed to Freeport, Ill.

The Lisk Manufacturing Co. has decided on the site for its new plant, at Canandaigua, N. Y.

A wire-drawing plant is to be added to the works of the Insulated Wire Co., at Sycamore, Ill.

The St. Paul (Minn.) Electric Manufacturing & Power Co. will erect a $5,000 plant at St. Paul.

A two-story pattern shop is being erected by the Whitcomb Manufacturing Co., at Worcester, Mass.

New machinery is being put in the plant of the S. C. Forsaith Machine Co., of Manchester, N. H.

There is talk of increasing the capacity of the Gilbert Car Works, at Green Island, Troy, N. Y.

The Western & Atlantic Railroad Co. will put new machinery in its machine shops, at Atlanta, Ga.

The Moffatt Journal Bearing Co., of Chicago, have increased their capital stock from $100,000 to $1,000,000.

The Upper Appomattox Electric Light Co., Petersburg, W. Va., will, it is reported, put new machinery in its electric light plant.

D. S. McCullough has purchased the Shelbyville, foundry and machine shop at Shelbyville, Tenn., and will greatly increase its capacity.

The Savannah, Americus & Montgomery Railway Co. (office Americus,

Ga.,) is reported as to erect machine shops and roundhouse at Clisby's Park, Montgomery, Ala.

It is announced that the Salem Wire Nail Co., with factories at Salem, O. and Findlay, O., have increased their capital stock from $100,000 to $500,000.

The Newport News & Mississippi Valley Railway Co., will remove its machine shops for the Ohio Valley division from DeKoven to Henderson, Ky.

It is said that the Eames Vacuum Brake Co. has secured control of a large tract of ground near Watertown, N. Y, upon which it will erect a manufactory.

The rebuilding on a larger scale of the works of the Carpenter Steel Works, Reading, Pa, recently burned, was commenced at once, in order to fill government contracts for steel projectiles for heavy ordnance.

THE year just closed has ended very badly for the iron rolling mills in Belgium, and looking back from month to month it is said a sadder epoch with the metal industries has scarcely ever existed. The troubles in the Argentine Republic have touched that district seriously, the more so as the exports from Belgium to Argentine nearly all consists of manufactured material. Belgium exported 22,149 tons in 1889; this was reduced in 1890 to 5 945 tons, and for the last 11 months to 2 315 tons.

New Ore Dock at Two Harbors.

The Duluth & Iron Range Railroad has received a large number of bids for building its new ore dock at Two Harbors, Minn. It will be 400 feet long, and will increase the dock shipping capacity of the road to about 1 300,000 tons of ore a year. It will be 51½ feet high and will cost about $175,000.

FELLOWES' PETROLEUM ATOMIZER

—FOR—

Open-Hearth, Crucible, Tube Welding, Heating, Puddling, Glass Melting

FURNACES,

Boilers, Brick Kilns, Ore Dryers,

—ALSO FOR—

Malleable Iron Works, Annealing Furnaces, Sand Dryers, Salt Dryers, Lumber Dryers, Breweries, Malt Dryers, Etc.

Shows a large economy over Coal—saving labor bills, repair bills, and increasing the capacity of the plant.

The most efficient, simple and economical oil burning system on the market. Can give the highest references as to the merits of system in the above trades. Hundreds of applications and years of proving has demonstrated its value.

ERNEST T. FELLOWES, President,

Pittsburgh Agency: HOWE SCALE CO., 107 Market St. } 45 and 47 Exchange Place, New York.

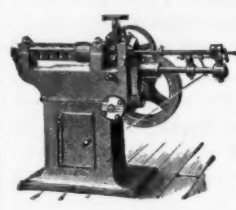
STEEL CASTINGS

FROM 1-4 TO 15,000 LBS. WEIGHT.

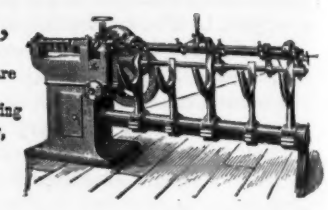
True to pattern, sound, solid, free from blow-holes and of great strength.
Stronger and more durable than iron forgings in any position, or for any service whatever.
60,000 CRANK SHAFTS and 50,000 GEAR WHEELS of this steel, now running, prove this.
Crossheads, Rockers, Piston-Heads, etc., for Locomotives STEEL CASTINGS of every description.
Send for circulars and prices to

CHESTER STEEL CASTINGS CO.,

WORKS: CHESTER, PA. } OFFICE: 407 LIBERTY ST. PHILADELPHIA, PA.



JOHN ADT & SON,
New Haven, Conn.
Builders of Machinery for Hardware Manufacture.
Automatic Wire Straightening and Cutting Machines, Butt Milling Machinery, Butt Drilling Machinery, Riveting Machines, Foot Presses, Sprue Cutters, Etc.



Alphabetical List of Advertisers

The star (*) indicates that the adv. appears alternate weeks; the dagger (†) once a month the double dagger (‡) once in three weeks.

	PAGE
Aitchison, Rob't Perforated Metal Co	15
Adt, John & Son	12
†Armstrong Bros	—
American Bridge & Iron Co	14
Burton, W. J. & Co	14
Bischoff, F. F. & Co	16
*Berger Mfg. Co	19
Babcock & Wilcox Co	20
Buffalo Specialty Mfg. Co	18
†Butman Furnace Co	—
Barr Electric Mfg. Co	17
Cleveland City Forge & Iron Co	20
Cleveland Twist Drill Co	20
Cleveland Iron Mining Co	13
Cleveland Rolling Mill Co	13-16
Cleveland Desk Co	13
Condit Fuller Co	13
*Copeland & Bacon	15
Colliau, Victor	18
Canton Iron Foundry Co	14
Cambridge Roofing Co	19
Cole, J. Wendell	20
Chester Steel Casting Co	12
Corrigan, Ives & Co	13
Canton Saw Co., The	20
Deming Co	18
Dixon, Jos., Crucible Co	15
Downerd & Son Co., The J	15
Egan Co	15
Edison General Electric Co	15
Eberts Bros	20
Eclipse Electrotype & Engraving Co	16
Frank & Co	18
Flaherty, J. H & Co	16
Fitzgerald, W. T	12
Fellowes, Ernst T	12
Graham Twist Drill Co	20
Garvin Machine Co	15
*Garfield Injector Co	13
Garry Iron Roofing Co	19
Graves, L. S. & Son	15
Gerlach, Peter & Co	13
*Gillette & Lewis,	—
Hutchison, W. S	20
Harrington & King Perforating Co	12
*Hodell, H. H. & Co	—
Hartford Steam Boiler Insp. & Ins. Co	16
Hackney Hammer Co	11
Hartman Sliding Blind Co	16
Hercules Powder Co	18
Iron Clad Paint Co	19
Industry File Works	20
Jones, E. H. & Co	18
Jeffrey Mfg. Co	14
Jenks, James	12
Kanneberg Roofing Co	19
*Leffel, Jas. & Co	19—
Ladd, Alfred W	17
Milton Mfg. Co	15
*Munn & Co	15
Michigan Emery Wheel Co	17
*Neracher Sprinkler Co	—
New Philadelphia Iron & Steel Co	13
Outhwaite, J. H. & Co	13
Oglebay, Norton & Co	13
Oldfield, L. H	16
Pope, E. C	13
Parkin & Bosworth Co	20
Palmer, Cunningham & Co	14
Peuberthy Injector Co	20
Pollock, Wm. B. & Co	18
Pratt Chuck Co, The	18
Rogers & Hubbard Co	17
Rowell, Geo. P. & Co	15
Reynolds Bros	20
Schleicher, Schumm & Co	18
Sykes Iron Roofing Co	19
Sackman, F. A	14
Southwark Foundry & Machine Co	19
Stirling Co	18
Stilwell & Bierce Mfg. Co	20
Spicer Mfg. Co	15
Shepard, H. L., Agent	17
Skinner Engine Co	19
Stevens, F B	19
*Simpson, Thos P	—
Sterling Grate-Bar Co	14
Toledo Machine & Tool Co	18
Tod, Wm. & Co	18
Totten & Hogg Iron & Steel Foundry Co	11
Van Duzen Gas Engine Co	16
Upson Nut Co	16
Union Electrotype Foundry	14
Universal Radial Drill Co	20
Unger & Wigham	19
Union Photo Engraving Co	20
West, Thos. D. Foundry Co	14
Westinghouse Machine Co	19
Wyckoff, Seamans & Benedict	18

SECOND-HAND MACHINERY
For Sale.

1 Engine Lathe 25-inch Swing 14-foot Bed.
1 Engine Lathe 18-inch Swing 6-foot Bed.
1 Iron Planer 24" x 24" x 5'.
1 24 inch Back Geared Drill.
1 No. 4 Garvin Plain Milling Machine with Mandrels and Cutters.
1 Whiton Centering Machine.

Above Tools are in First-Class Order.

JAMES JENKS,
Dealer in Machinery, DETROIT, MICH.

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For INVENTORS. 40-page BOOK FREE. Address W. T Fitzgerald, Att'y at Law. Washington, D.C.

CATALOGUES

Printed in the Highest Style of Art, by
The Cleveland Printing & Publishing Co.,
Cleveland, O.

CLEVELAND ROLLING MILL CO.

MANUFACTURERS OF

BESSEMER AND OPEN-HEARTH STEEL,

Blooms, Billets, and Slabs. Steel Rails, Steel Beams, Channels and Angles. Steel Forgings.
Bar, Spring and Sleigh Shoe Steel. Steel Wire of all kinds. Barbed Wire.
Iron and Steel Plates. Galvanized and Black Sheet Iron and Steel.
Corrugated Iron Roofing.

IRON AND STEEL MARKETS.

PIG IRON.

CLEVELAND (f. o. b. cars, net cash) Bessemer, $15 70; No. 1 Foundry, $15 20; No. 2 Foundry, $14 70; No. 1 Gray Forge, red short, $14 20; No. 2 Gray Forge, neutral, $14 20; No. 1 American Scotch, $15 70; No. 2 American Scotch, $14 70.

CHICAGO (reported by Messrs. Rogers, Brown & Merwin): Southern Coke No. 1 foundry, $16 00@16 75; Southern Coke No. 2 Foundry, $15 00@15 75; Southern Coke No. 3 Foundry, $14 25@15 00; Southern Coke No 1, Softeners, $15 00@15 75; Southern Coke No. 2, Softeners, $14 25@15 00; Ohio Silveries No. 1, $17 50@18 50; Ohio Silveries No. 2, $16 50@17 50; Ohio Strong Softeners No. 1, $18 00@19 00; Ohio Strong Softeners No. 2, $17 00@18 00; Lake Superior Charcoal Nos. 1 to 6, $17 00@18 00; Tennessee Charcoal No. 1, $1700@18 00; Tennessee Charcoal No. 2, $16 50@17 50; Southern Standard Car Wheel, $21 00@23 00; Tennessee Standard Car Wheel, $00 00@00 00.

CINCINNATI (reported by Rogers, Brown & Co.): FOUNDRY IRONS—Southern Coke, No. 1 foundry, $14 75@15 25; Southern coke, No. 2 and No. 1 soft, $13 75@$14 20; Hanging Rock Coke, No. 1 foundry, $16 50@17 00; Jackson Co. Stone Coal, No. 1 foundry, $16 50@17 00; Tennessee Charcoal, No. 1 foundry, $17 00@17 50; Hanging Rock Charcoal, No. 1 foundry, $19 75@21 00. MILL IRONS—Standard Southern Coke, grey forge, $12 50@12 75; Standard Southern Coke, mottled, $12 25@12 50; Cold Short Southern Coke, grey forge, $12 75@13 00; Strong Ohio Neutral Coke, grey forge, $15 00@15 50. CAR WHEEL AND MALLEABLE—Standard Alabama Car Wheel, $19 00@20 00; Tennessee Car Wheel, $18 00@19 00; Lake Superior Car Wheel, $19 50@20 50.

BUFFALO (reported by Rogers, Brown & Co.): Mahoning and Shenango Valley strong, No. 1 Foundry, $16 00@00 00; Mahoning and Shenango Valley strong, No. 2 Foundry, $15 00@00 00; Ohio Softener No. 1, $16 20@00 00; Ohio Softener No. 2, $15 20@00 00; Jackson Co., Silvery No. 1, $18 00@00 00; Jackson Co. Silvery, No. 2, $17 00@00 00; Lake Superior Charcoal, $18 50@00 00; Tennessee Charcoal, $18 25@00 00; Southern Softener No. 1, $15 75@00 00; Southern Softener No. 2, $15 00@00 00; Southern Strong No. 1 Foundry, $16 75@00 00; Southern Strong No. 2 Foundry, $15 75@00 00· Alabama Car Wheel, $19 75@20 75; Hanging Rock Charcoal, $21 00@22 00.

LOUISVILLE (reported by Hall Bros. & Co.) HOT BLAST FOUNDRY—Southern coke No. 1, $14 00@14 25; Southern coke No. 2, $13 25@13 75; Southern coke No. 3, $13 00@13 25; Mahoning Valley (Lake ore mixtures), $00 00@00 00; Southern charcoal, No. 1, $16 00@17 00; Southern charcoal, No. 2, $15 50@16 00; Missouri charcoal, No. 1, $17 00@17 50· Missouri charcoal, No. 2, $16 50@17 00. FORGE—Neutral coke, $12 50@12 75; Cold short, $12 25@12 50; Mottled, $11 50@12 00. CAR WHEEL AND MALLEABLE—Southern (standard brands), $18 00@18 50; Southern (other brands), $17 00@17 50; Lake Superior, $19 50@20 50.

ST. LOUIS (reported by Rogers, Brown & Meacham): HOT BLAST COKE AND CHARCOAL—Southern Coke No. 1, $15 25@15 50; Southern Coke No. 2, $14 50@14 75; Southern Coke No. 3, $13 75@14 25; Southern Grey Forge, $13 00@13 25; Southern Charcoal No. 1, $17 00@17 50; Southern Charcoal No. 2, $16 25@16 75; Missouri Charcoal No. 1, $15 50@16 00; Missouri Charcoal No. 2, $15 00@15 50; Ohio Softeners, $18 00@19 00. CAR WHEEL AND MALLEABLE IRONS—Lake Superior, $19 50@20 00; Southern, $19 50@20 00. CONNELLSVILLE COKE—East St. Louis, $0 00; St. Louis, $5 65.

DETROIT (reported by William F. Jarvis & Co): Lake Superior Charcoal, all Numbers, $17 00@18 00; Lake Superior (coke) Bessemer, $16 50@17 00; Katahdin (Maine charcoal), $00 00@00 00; Lake Superior Coke, Foundry, all ore, $17 00@18 00; Lake Superior Coke, Foundry, all ore, $00 00@00 00; Standard Ohio Black Band, $17 50@18 00; Southern No. 1 $15 25@15 50; Southern Gray Forge, $13 75@14 25; Jackson County (Ohio) Silvery, $18 00@18 50; Old Car Wheel, $00 00@00 00. Connellsville Coke, $0.00.

LOUISVILLE (reported by Geo. H. Hull & Co): Southern Coke No. 1 Foundry $14 25@14 75; Southern Coke No. 2 Foundry $13 50@13 75; Southern Coke No. 3 Foundry $12 75@13 25; Grey Forge, $12 50@13 00; Southern Coke Silver Grey, $00 00@00 00; Southern Charcoal No. 1 Foundry, $15 75@16 75; Car Wheel, $17 75@19 75.

PITTSBURGH (reported by A. H. Childs): No. 1 Foundry, $15 50@16 00; No. 2 Foundry, $14 50@15 00; Grey Forge, $13 50@13 75; White and Motlled, $13 00@13 25; Warm Blast Charcoal, $18 00@22 00; Cold Blast Charcoal, $22 00@26 00; Bessemer, $15 25@15 75.

MERCHANT IRON AND STEEL.

Flat Bar

1½ to 4 by ⅜ to 1 inch	1 70
4½ to 6 by ⅜ to 1 inch	1 35
1½ to 6 by 1¼ to 2 inch	2 15
1½ & 1¾ by ⅜ to ½ inch	1 85
1 & 1¼ by ⅜ to ½ inch	1 95
⅝, ¾ and ⅞ by ⅜ to ½ inch	2 15

Round and Square.

1 to 1⅜ inch	1 75
2 to 2⅜ inch	1 95
2¼ to 3¼ inch	2 25
3½ to 4 inch	2 75
4¼ to 4½ inch	3 25
4¾ to 5 inch	3 45

Ova

½ to 1¼ inch	2 15
⅝ to ¾ inch	2 25
⅝	2 55
⅛	2 95

Half Oval and Half Round.

¼ to 3 inch	2 85
⅜ to 1¼ inch	2 45
½ to ¾ inch	3 05
⅝	3 25
¾	4 75

Heavy Band.

¼ to 6 by ¼ and 5-16 inch	1 55
½ to 1¼ by ¼ and 5-16 inch	2 05
⅝ to ⅞ by ¼ and 5-16 inch	2 25
¾ to 9½ by ¼ and 5-16 inch	3 75

Hoops.

1¼ to 4, Nos. 13 to 15	2 55
1¼ to 2, Nos. 16 to 18	2 65
1¼ to 2, No. 19	2 75
1¼ to 2, No. 20	2 85
1¼ to 2, No. 21	2 95
1¼ to 2, No. 22	3 05
15-16, I and 1¼, Nos. 13 to 15	2 75
15-16, I and 1¼, Nos. 16 to 18	2 85
15-16, I and 1¼, Nos. 19 and 20	2 95
15-16, I and 1¼, No. 21	3 05
15-16, I and 1¼, No. 22	3 15
⅞, Nos. 13 to 15	2 95
⅞, Nos. 16 to 18	3 05
⅞, Nos. 19 and 20	3 15
⅞, No. 21	3 25
⅞, No. 22	3 35
13-16, Nos. 13 to 15	3 15
13-16, Nos. 16 to 18	3 25
13-16, Nos. 19 and 20	3 35
13-16, No. 21	3 45
13-16, No. 22	3 55
¾, Nos. 13 to 15	3 25
¾, Nos. 16 to 18	3 45
¾, Nos. 19 and 20	3 55
¾, No. 21	3 65
¾, No. 22	3 75
11-16, Nos. 13 to 15	3 55
11-16, Nos. 16 to 18	3 65
11-16, Nos. 19 and 20	3 75
11-16, No. 21	3 85
11-16, No. 22	3 95
⅝, Nos. 13 to 15	3 75
⅝, Nos. 16 to 18	3 95
⅝, Nos. 19 and 20	4 05
⅝, No. 21	4 15
⅝, No. 22	4 25
⅝, No. 23	4 45

Light Band.

1¼ to 6 by ⅛ to 3-16 in	2 20
1¼ to 6 by Nos. 11 and 12	2 30
1 to 1¾ by ⅛ to 3-16 in	2 40
1 to 1¾ by Nos. 11 and 12	2 50
⅜ and 13-16 by ⅛ to 3-16 in	2 70
⅜ and 1 3-16 by Nos. 11 and 12	2 80
⅜ and 11-16 by ⅛ to 3-16 in	3 00
⅜ and 11-16 by Nos. 11 and 12	3 10
⅜ and 9-16 by ⅛ to 3-16 in	3 30
⅜ and 9-16 by Nos. 11 and 12	3 40
½ by ⅛ to 3-16 in	3 60
½ by Nos. 11 and 12	3 70

Wagon Box Iron.

⅜ inch, beveled edge, by Nos. 11 and 12	2 80
⅜ inch, " " " 13 and 14	3 00
½ inch, " " " 11 and 12	3 10
½ inch, " " " 13 and 14	3 30

Sheet Iron.

No. 10 to 14	2 45
No. 15 to 17	2 55
No. 18 to 21	2 75
No. 22 to 24	2 85
No. 25 to 26	2 95
No. 27	3 25
No. 28	3 50

Iron Boiler Plates.

Tank, ¼ inch and heavier	2 25
C No. 1, " "	2 40
C H No. 1 " "	2 50
C H Flange, " "	3 10
Extra Flange, "	4 00
Solid Fire Box "	4 75

Steel Boiler Plates—1-4 in. and Heavier.

Tank	2 25
Shell	2 50
Flange	2 75
Marine Flange	3 00
Fire Box	4 00

Above includes plates 90 inches wide.

90 to 96 in. wide	¼c lb extra
96 to 100 in. wide	1 c "
100 to 104 in. wide	1¼c "
104 to 116 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. lbs
1 to 2 in. inclusive	08
9-16 to ½ in "	08½
7-16 to ⅜ and 2¾ to 3 in	09
3¼ to 4 in	09½
⅝ to 11-16 and 4¼	10
¼ to 6 in	0⅛
¼ to 9-32 and 6¼ to 7 in	11
3-6 in	13

Flats.

	cts. lbs
2 to 9-16 wide by 2 to ⅜ thick	8

Bessemer and O. H. Steel.

Machinery	base price,	2 35
Tire	"	2 25
Spring	"	2 80
Sleigh Shoe	"	2 50
Toe Calk	"	2 35
Cutter Shoes, tapered and burr.	"	2 75

English Tool Steel.

Jessop's	15½c
Hobson's "Best"	15½c
" "Choice"	35c

Burden Boiler Rivets.

⅜, ½, 11-16 and ⅝ inches diameter	4 00
Bridge ⅜, ½, 11-16 and ⅝ inch diam	4 00

SCRAP IRON AND OLD METAL.

	NET TONS
No. 1 R. R. wrought scrap	$18 00
No. 1 wrought scrap	16 50
No. 1 Machine cast scrap	11 50
Iron axles	23 50
Axle turnings	13 50
Wrought turning (free from cast)	11 50
Cast borings	8 00
Uncut wrought iron boilers	11 50
Steel boiler plates	16 00
Grate Bars	8 00
Pipes and flues (Clean)	12 00
Tank iron	12 50
Hoop and band iron	9 50
Sheet iron	8 50
Wrought drillings	11 00
Malleable iron	9 50

Reported by Messrs. BLACK & POLLOCK, Cincinnati, O.:

Railroad Wrought	$20 00
No. 1 Country Wrought	17 00
Stove Plate	8 75
Machine Castings	11 00
Hoop and Sheet	8 00
Casting Borings	9 00
Wrought Turnings	12 00

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WADSWORTH, O.,

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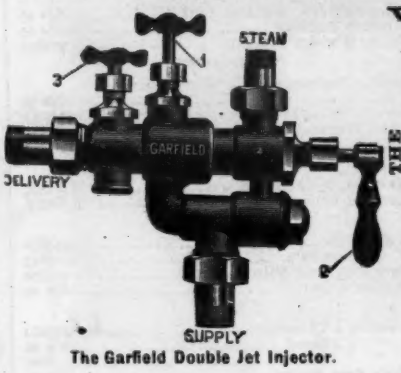

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Automatic Injector,
Double Jet Injector
AND
Ejector.

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American.....₩ lb @10
Wrights.....₩ lb 12

Bellows.

Blacksmiths' { Hill's.....dis 40 / Bullock's.....dis 50&10
Moulders'.....dis 40@40&10
Hand.....dis 40&10@50

Belting.

Boston Belting Co's standard.....dis 70
" " " extra.....dis 60&5
" " " best.....dis 55
Hoyt's Short Lap.....dis 45
Cleveland Rubber Co. extra standard..dis 60&10
Shults Raw Hide Leather Belting, single.....dis 40
Shults Raw Hide Leather Belting, double, and Light Double.....dis 40
Standard, oak tanned.....dis 50&10
Alexander Brothers' pure oak tanned....dis 45

Blowers and Exhausters.

B. F. Sturtevant's.....dis 20
Boston Blower Co.,.....dis 35
Buffalo.....dis 35

Borax.

.....₩ lb 12

Chalk.

White.....₩ gross 50
White Crayon.....₩ gross 12@12½ dis 10
Red.....dis 70
Blue.....dis 85

Chucks.

Cushman's 4 Jaw Independent.....dis 45
" Combination.....dis 40
" Geared Scroll.....dis 30
" 2 Jaw Brass Workers.....dis 50
" Drill.....dis 35
Wescott's Scroll Combination.....dis 33⅓
" Independent.....dis 40
" Little Giant Drill.....dis 30
Horton's Universal.....dis 40
" Independent.....dis 45
Whiton's Independent.....dis 45
National Combination.....dis 40
Sweetland " .....dis 40
Almond Drill.....dis 20
Morse " .....dis 15
Skinner's Combination Lathe.....dis 33⅓
" Independent Lathe.....dis 40
" Universal Lathe.....dis 40
" Drill.....dis 15

Cutters and Reamers.

Cleveland.....dis 10@15
Pratt & Whitney.....dis 10@15
Standard.....dis 10@15
Brown & Sharpe, Milling Cutters.....dis 15
" Gear Cutters.....dis 15

Crowbars.

Cast Steel.....₩ lb 4
Iron, steel points.....₩ lb 3½

Drill and Drill Sockets.

Twist drills.....dis 50&10
Morse Taper and Straight shank to 1¼".....dis 50&10
Morse Taper and Straight shank Larger than 1¼".....dis 25
Drill Sockets.....dis 25
Standard Twist Drills.....dis 55@55&5
Cleveland " " .....dis 55@55&5

Emery.

	No. 4 to 46 gr.	No. 54 to 150. gr.	Flour, F.	C. F. FF.
Kegs, ₩ lb	4 c	5 c		2½c
½ kegs ₩ lb	4½c	5½c		2½c
¼ kegs ₩ lb	4½c	5½c		3 c
6 lb cans, 10 in case	6 c	6½c		5 c
6 lb cans, less than 1	10 c	10 c		7½c

Emery Cloth and Paper.

Barder, Adamson & Co.....dis 45@50
H. H. Barton.....dis 50@50&10

Emery Wheels.

Detroit.....dis 55@60
Norton's.....dis 55@60
Grant.....dis 55@60
Sterling.....dis 60
Celluloid.....dis 10&33⅓
Northampton.....dis 55
Crystal.....dis 65@70
Vitrified.....dis 6
Vulcanite.....dis 10&10

Files.

Nicholson.....dis 60&10@60&10&10
" X. F.....dis 25
Kearney & Foot.....dis 60&10@60&10&10
Black Diamond.....dis 60&10@60&10&10
Arcade.....dis 60&10@60&10&10
Disston's.....dis 65@70
Western.....dis 70
Stub's.....dis 25
Grobet's.....dis 30
Reynolds Bros.' Hand Cut.....dis 50
ndustry File Works, hand cut.....dis 50

Hammers.

P. S. W.....dis 40
Atha new list, Jan. 15, 1887.....dis 50
Heavy hammers and sledges under 5 lbs. 18c over 5 lbs 14c, new list.

Jack Screws.

Illinois Bolt Co. list.....dis 70

Nuts and Washers.

Size of bolt inches	⅜	5-16	½	⅝	¾	⅞	1
Square	8	7	5½	4½	4	3½	3⅛
Hexagon	15⅜	11⅜	8⅛	6	5⅜	5⅛	5
Washers	9	8	7	5	4½	4⅛	4⅛

In lots less than 100 lbs, ₩ lb add ⅛c., 1lb boxes add 1c to list.

Nails (wire.

List July 14, 1887.....dis 70 &10
Standard Penny Nails, ₩ keg card rate { Car lots.....$2.30 / Less than car lots $2.40

Oilers.

Zinc and Tin.....dis 60
Brass and Copper.....dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz.....dis 10@10&10

Packing, Steam.

Boston Belting Co.....dis 60
American Packing Hemp.....₩ lb 10@11
Russia Packing " .....₩ lb 14
Italian Packing " .....₩ lb 12@14
Plumbago Piston.....₩ lb 40
Morrison's " .....₩ lb 50
Square Flax " .....₩ lb 50
Sheet Rubber.....₩ lb 12&24
Excelsior Rubber.....₩ lb 40

Picks.

Railroads, 5 to 6 lbs.....$12 dis 60
" 6 to 7 lbs.....$13 dis 60

Pulleys.

Iron Pulleys, Walker List.....dis 45
Medart Pulleys.....dis 55
Split Wood Pulleys.....dis 50@55

Rivets.

Iron, Thousand, list November 17, ...dis 50
Iron, Ordinary, Cooper's Block and Carriage list November 17.....dis 50
Copper.....dis 50@50&10

Rope.

Manilla, ¾ inch and over.....₩ lb 15¾
Sisal, ¾ inch and over.....₩ lb 13¾

Sand Paper.

B. A. & Co.....dis 45@50
H. H. Barton's.....dis 40@45
New England Flint.....dis 40@50
Barton's Garnet.....dis 20

Saws.

Disston's Circular.....dis 40@10
" Band.....dis 20
" Scroll.....Net
Hack Saw Stubs.....dis 20
" " Eureka.....dis 20
" " Star.....dis 20
Saw Swages Disston's.....dis 30
Atkins' Cicular Saws.....dis 40&45
" Mill, Mulay and Drag Saws..dis 40&10
" Wood Saws.....dis 40&10
" Silver Steel Diamond Cross-cut Saws.....dis 70c per ft
" Dexter Cross-cuts.....dis 50c "
" Diamond " .....dis 30c "
" Tuttle Tooth Cross-cuts..dis 25c "
" One-man Cross-cuts.....dis 32c "
No. 1 Handles.....dis 25c per pair
No. 6 " .....dis 16c "
Excelsior Saw Tools.....$6 per doz
Perfection " .....$15 "
Detroit Saw Works, Circular.....dis 50
" " " Band.....dis 25
" " " Mulay.....dis 45

Screws.

Wood Screws—New List 1890.

Flat head iron.....dis 72½
Round head iron.....dis 67½
Flat head brass.....dis 72½
Round head brass.....dis 65
Square Cap.....dis 65
Hexagon Cap.....dis 60
Set C. H. C. P.....dis 70
Machine, flat head, iron.....dis 65
Machine, round head, iron.....dis 60
Bench and hand—
Lag or coach.....dis 75@75&10
Coach patent gimlet point.....dis 75

Shovels and Spades.

Ames' list November 1, 1885.....dis 20
Dennis.....dis 5.25
Hussey & Binns railroad.....dis 8.00

Taps.

	Hand and Nut to	
Cards,	2 in	dis 50
Carpenters'	" "	dis 50
Morse	" "	dis 50
Pratt & Whitney	" "	new list dis 10
Machine Screw Taps		dis 55
Pipe Taps to 2½ in.		dis 70
Stay Bolt Taps		dis 25
Stove Bolt Taps		dis 50
Pulley Taps		dis 40

Twine.

	BC.	B.
No. 12, Flax Twine, ¼ and ⅛ lb Balls	21c@20c	
No. 18 " " ¼ and ⅛ "	18c@18c	
No. 36 " " ¼ and ⅛ "	16c@17c	
2-Ply Hemp, ¼ & ⅛ lb Balls (Spring Twine	11½c	
3-Ply " 1 lb Balls	12@12½c	
3-Ply " 1½ lb Balls	11@11½c	
Cotton Wrapping, 5 Balls to lb	15@16c	

Vises.

Solid Box.....dis 60
Parker's.....dis 20@35
Prentiss.....dis 20
Stephen's.....dis 25@30
Barrett's.....dis 30
Miller's Falls.....dis 40
Merrill's.....dis 15@20
Howard.....dis 35

Wire.

New List, Jan. 18, 1884

Brass and copper.....dis 20@25
Bright and annealed, Nos. 0@18...dis 70&10@75
" " Nos. 19@26..dis 75@75& 5
" " Nos. 27@36..dis 75&10& 5
Coppered Nos. 0 to 18, market list..dis 70@70& 5
Galvanized Nos. 0 to 18 " " .....dis 65&5
Tinned market Nos. 0 to 18.....dis 67½
Cast steel.....dis 50
Tinned Broom Wire.....dis 70&5@70&10
Annealed Fence, Nos. 8 and 9.....dis 75
Annealed Grape, Nos. 10 to 14.....dis 75
Stub's Steel Wire, regular.....$5.00@lb dis 5

Wrenches.

Coe's genuine,.....dis 50
Girard Standard.....dis 70&10
Agricultural.....dis 75&10
Mechanics'.....dis 55&10,& 5
Bemis & Call's Combination.....dis 25
Donohue's Engineers.....dis 20&10
Lamson & Sessions Engineers.....dis 60
Billings & Spencer's Drop Forged.....dis
William's " " .....dis
Alligator " " .....dis

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THE INDISPENSABLE LATHE DOGS can be attached to work after the work is centered in the lathe. They can be used equally as well BETWEEN COLLARS as upon plain or straight work.

DROP FORGED FROM BAR STEEL.

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" 2 " ½ to 2¼ " " 2 50
" 3 " 1 to 3¼ " " 3 50
Price, per set of three, to take from ¼ to 3¼ in. 7 50

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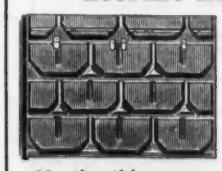

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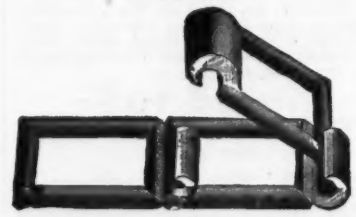

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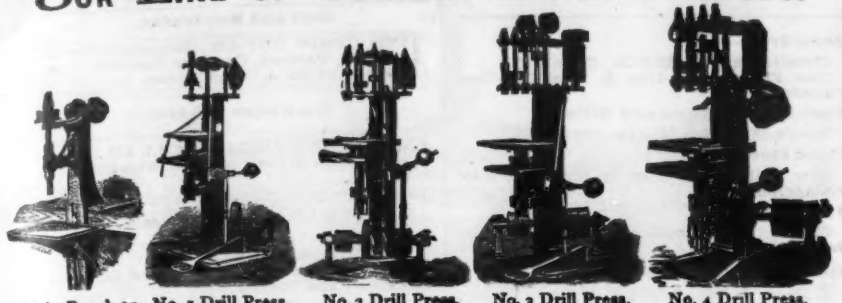

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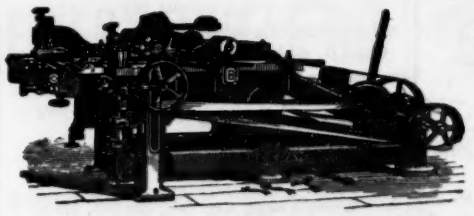

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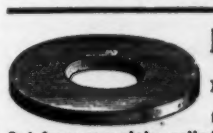

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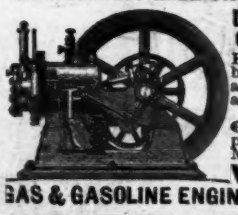

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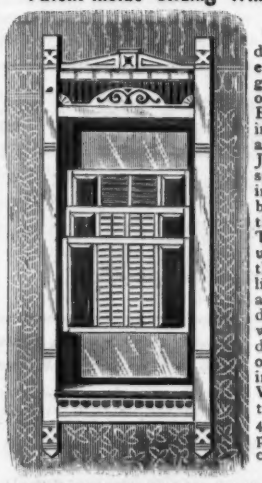

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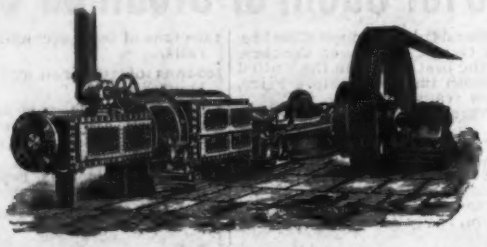

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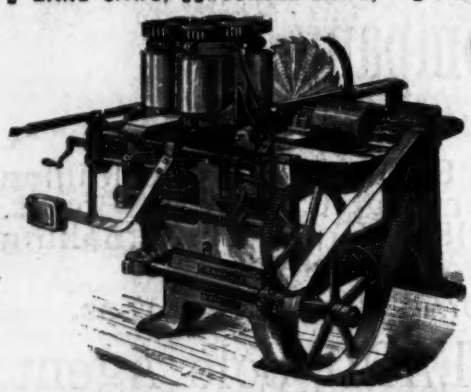

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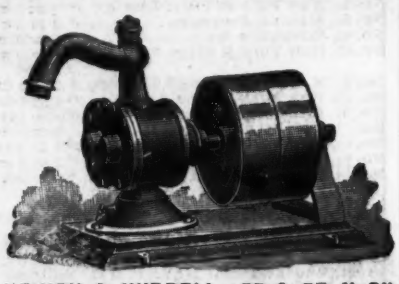

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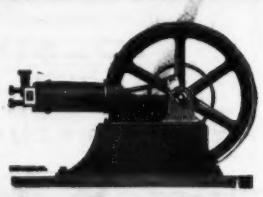

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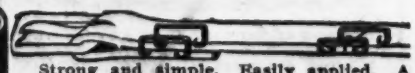

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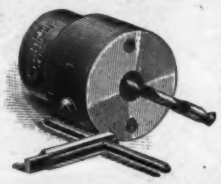

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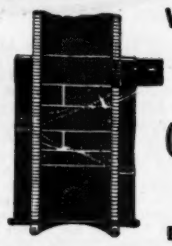

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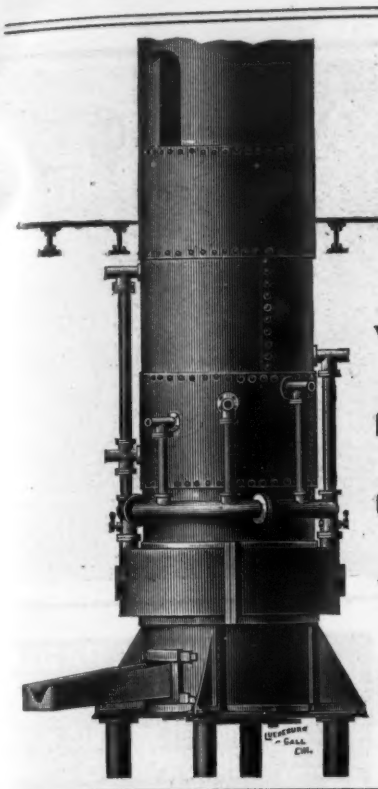

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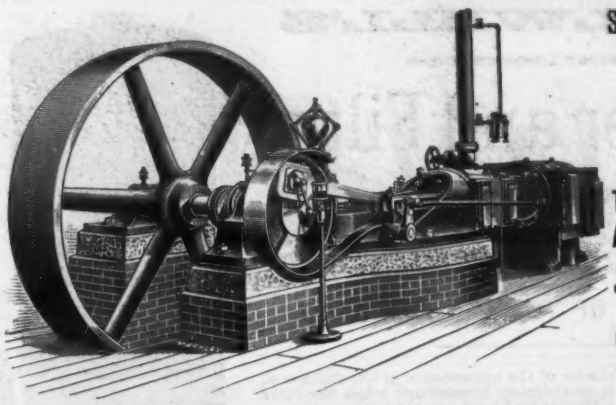

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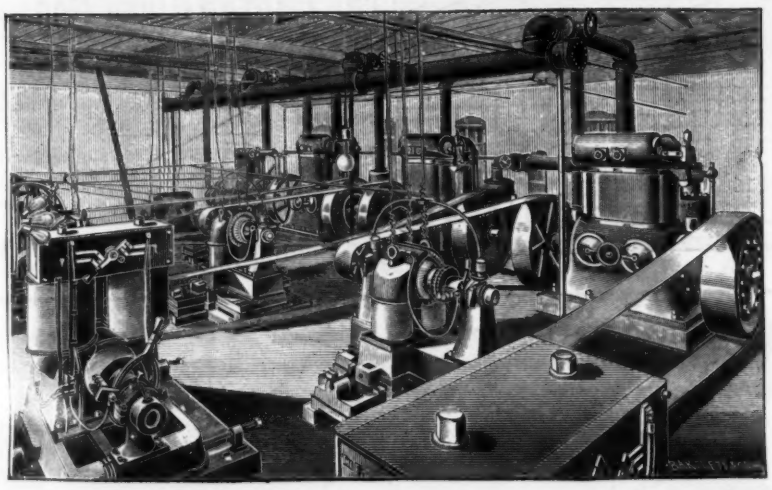

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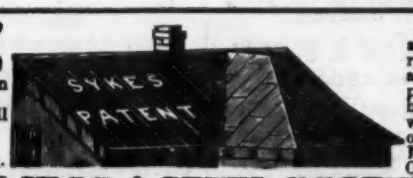

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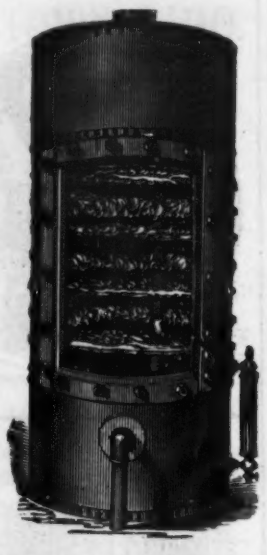

This cut is the fac simile of the appearance of the shelves o. a No. 5 Heater at work on ordinary lime-water when the door was removed after the Heater had been running two weeks.

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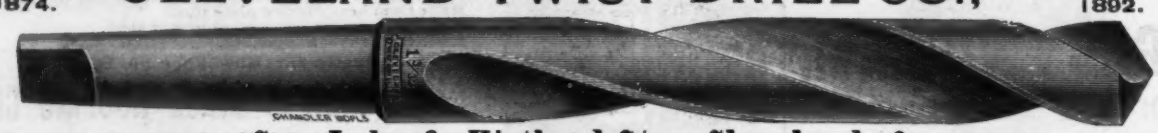

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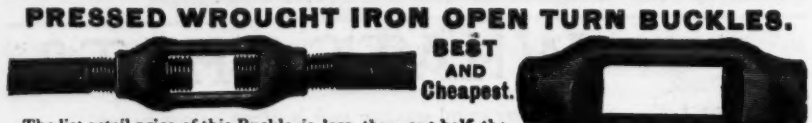

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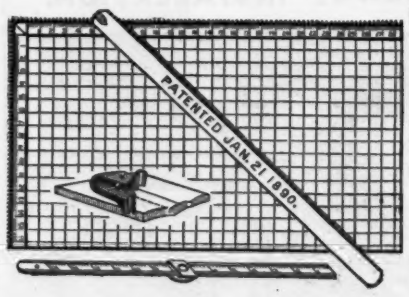

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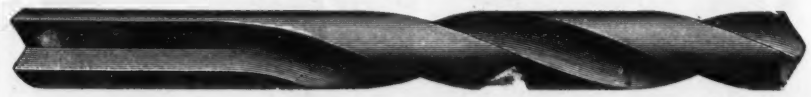

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